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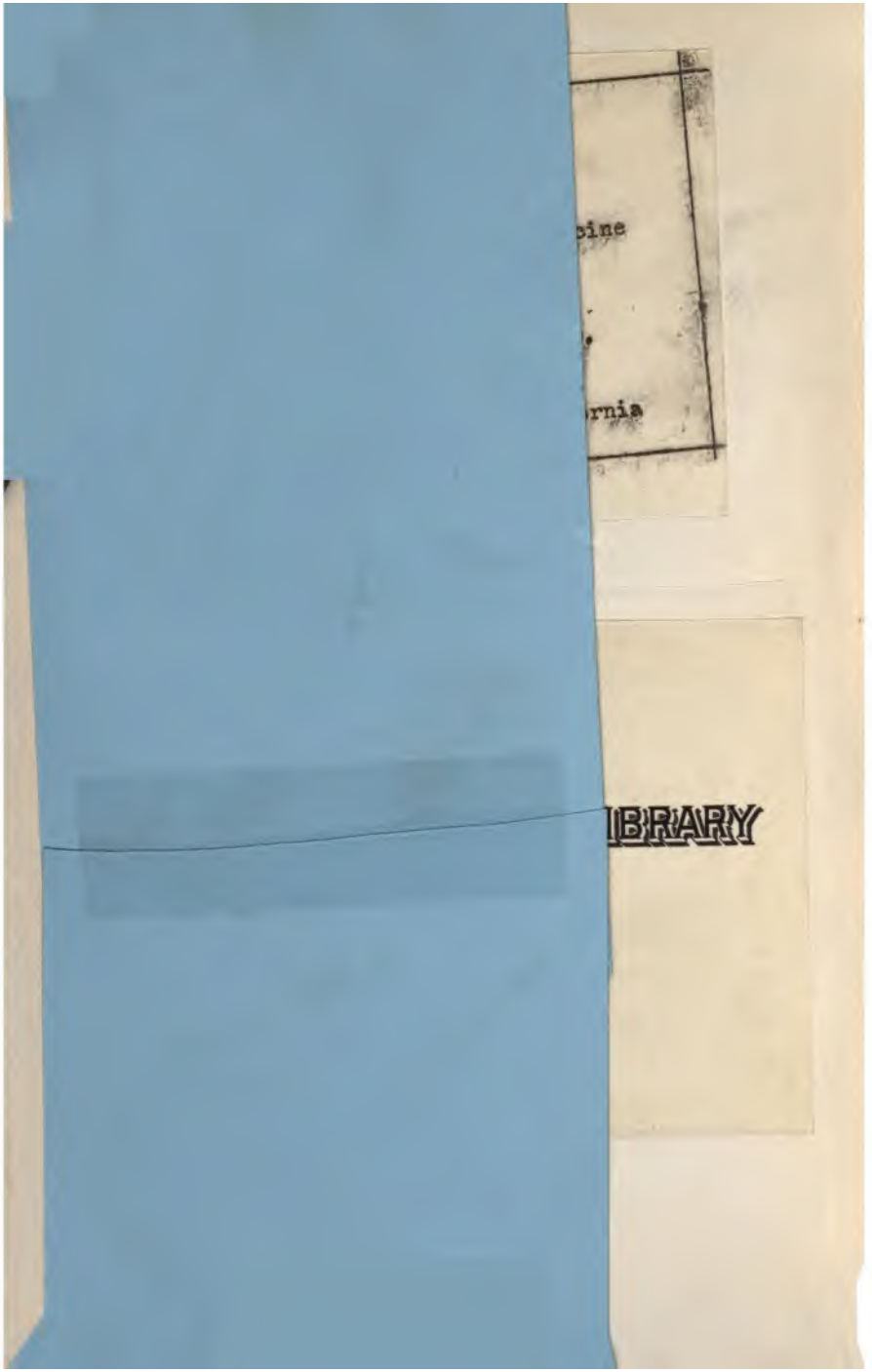
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IBRARY

DIET FOR THE SICK

ARRANGED AND COMPILED FROM LEADING AUTHORITIES, WITH SUPPLEMENTARY NOTES

BY

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Published by

American Medical Publishing Co.

84 William Street New York City

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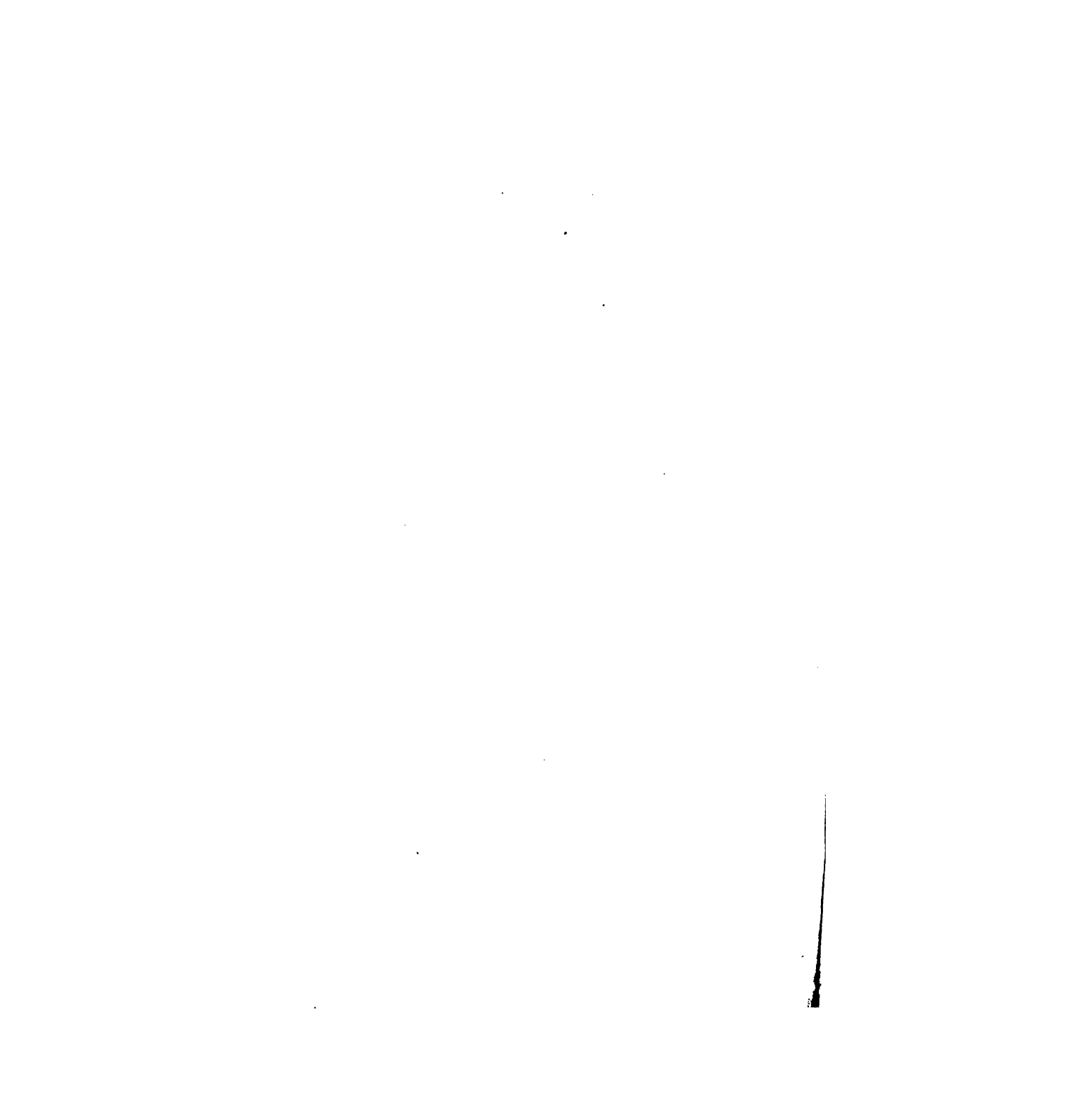

PREFACE.

Little claim for originality is made for this brief manual on feeding the sick. Frankly, it is to a large extent, a compilation from the writings of many different authors. Great care has been exercised in the selection of the material, however, with the constant aim of presenting only such facts and information as will prove most serviceable to the general practitioner in his every day work. From the standpoint of practical utility, we believe this little volume will be found quite unique, for up to the present time, contemporary medical literature has known no other brief, condensed manual affording a larger amount of definite, well established data on the all important subject of feeding the sick.

Therefore, while little or no credit can be claimed for originality, we believe the condensed but remarkably complete character of the book, together with its systematic arrangement, will appeal to the busy physician and win his instant approval and regard.

Used in every day work, "Diet for the Sick" will not only answer constantly arising questions as to what each patient should or should not eat, but in addition, will supply brief and accurate information on the composition of foods, the processes of digestion, caloric feeding and such other topics as are essential for the common sense use of the practical principles of dietetics in the management of disease.

The following text-books have been freely drawn upon in compiling "Diet for the Sick":

"Practical Dietetics," by W. Gilman Thompson, M. D., published by D. Appleton & Co., New York.

"Practical Dietetics," by Alida Frances Pattee, published by A. F. Pattee, Mt. Vernon, N. Y.

"Human Physiology," by A. P. Brubaker, M. D., a small but truly remarkable work on the subject, published by P. Blakiston's Son & Co., Philadelphia, Pa.

and several others, due credit to which has been given in the regular foot-notes.

The above books should be in every physician's library since they represent the latest and most authoritative views on everything pertaining to foods and feeding, and will be found of the greatest possible value by anyone who seeks full information on any phase or detail of the broad question of dietetics. "Diet for the Sick" is designed to serve solely as a working manual and to provide the reader with data for immediate use. For fuller information, reference must of course be had to the more ambitious and complete works referred to above. The more familiar the busy physician becomes with "Diet for the Sick," the more indispensable it will be found as a ready means of answering innumerable important questions that hitherto have too often been left unanswered, because of the effort and difficulty entailed in securing accurate dependable information on the subjects presented.

DIET FOR THE SICK.

CHAPTER I.

GENERAL CONSIDERATIONS.

In the modern management of disease there is hardly any question of greater importance, or one that is more apt to prove disturbing to the painstaking physician than that of diet; in other words, what food or nutriment shall he advise in each case to promote recovery, and what shall he interdict in order not to retard it? At first thought the problem of feeding the sick may appear a simple proposition of inducing patients to take adequate nourishment in spite of weakened digestive and assimilative powers. As the subject is more carefully considered, however, it will be seen that modern dietetics present a variety of questions which call not only for a careful study of each patient and his disease, but a thorough and comprehensive grasp of the character and composition of food stuffs and their action when taken into the body. While the clinical course of specific diseases and the more or less uniform composition of most articles of diet allow certain generalizations, in every instance there still remains the personal equation, or the modification offered by the particular conditions presented by each person. Necessarily uncertain and variable, it is this personal equation, that makes the selection of foods, the quantity to be used, the frequency of feeding and many other details connected therewith, individual problems to be solved in each case only by study of the individual and the metabolic phenomena which actually follow the ingestion of food.

There is no little truth in the old saying that "what is one man's meat, is another's poison." Innumerable examples to support and substantiate such a belief might be brought forward. Different individuals, even when in as nearly perfect physical health as possible, are often affected in widely different ways by the same article of diet. Take, for instance, fish. The average person may have no trouble whatsoever from the use of fish day in and day out. As everyone knows, it forms the staple diet year after year in many communities. But for the denizens of the sea, countless people would many times suffer severely for lack of food. Such people never undergo any ill effects from such a diet, and yet there are a great many others to whom fish is an active poison, a small quantity setting up the most violent pain, followed by distress, nausea, vomiting, depression and collapse. In still others while producing a much less violent reaction, it will occasion a number of skin diseases such as certain forms of erythema, urticaria, dermatitis, pruritus, etc.

Similar variations in the effects produced on the body are observed from the ingestion of pork, game, certain kinds of vegetables, fruits, milk, the condiments, etc. In a measure every article of food reacts differently on not only different individuals, but also on the same individual at different times. This is obviously due to the fact that even in healthy individuals, the processes of digestion, absorption and assimilation, all essentially chemical in character, are constantly varying. As Wells says so tritely, "the human body is made up of a vast, unceasing series of chemical reactions." Complex and variable, the metabolism of the human body consists of a series of splitting and building processes, through which new substances are constantly being formed. As long as these substances are the usual

or normal products of metabolism, the nutrition remains well balanced and a metabolic equilibrium is maintained. If however, the working elements, the enzymes or ferments, become either overactive or depressed, the situation changes immediately. The nutritional balance is lost, the ordinary products of metabolism are formed either in excess, or in decreased quantities, new and abnormal substances are created, and straightway the forces that made for health, become factors in the causation of disease. Not only do these aberrant forces give rise to definite diseases, the so-called disorders of metabolism or nutrition, but through their essentially depressing influence on the vitality of the tissues they weaken the powers that ordinarily offer adequate defense against bacterial attack, and thus predispose the body to the infectious or contagious diseases. The foregoing—enzyme variation and nutritional derangement—can all too often be traced to dietetic errors or indiscretions, and it is not uncommon to find the whole metabolism of a healthy person suddenly altered and completely disarranged by a faulty diet or the simple ingestion of some impure article of food.

Since the healthy body is so sensitive to the kind and quality of the foods ingested, it is not to be wondered at that the adaptation of nutriment to the body wracked by disease is invariably a difficult and intricate problem.

But while ever ready to detect variations in the reactions to food stuffs incidental to physiologic processes, the modern dietitian must never fail to make due allowances for the primary or fundamental influences exerted by age, sex, race, climate, season, physique, habits, occupation, personal idiosyncrasy, and many other conditions.

The modifying effects of these factors on the digestion, absorption, and assimilation of different kinds of foods are evident, and together with the potent influences exerted by physiologic or pathologic processes, constitute the agencies that control the body's reactions to food.

Not all of these various factors are equally active, nor does any one of them exert the same influence all the time. But in every individual all of them at one time or another exert some influence, be it great or small, and the physician who accomplishes the most with dietetic measures in the management of any case at any particular time, is the keen observer who is best able to measure the relative potency of each modifying influence and in the light of its actual effect form a correct estimate of the metabolic capacity of his patient.

Summed up, therefore, careful study of each patient's physical economy, thoughtful consideration of all presenting influences, and painstaking investigation of the elimination enable a practitioner to draw fairly accurate and safe conclusions as to a patient's probable reaction to any diet. Then, there is nothing left but to make careful tests and determine the actual results. After all is said and done, it is the results—the effects produced by this, that or the other food—that ultimately define the diet that a patient can take with the utmost advantage—and the least harm.

CHAPTER II.

THE COMPOSITION OF THE HUMAN BODY.[1]

I. INORGANIC PRINCIPLES.

Oxygen is one of the constituent elements of all the fluids and solids of the body. It is found in a free state in the respiratory passages and intestinal tract; it is held in solution in the lymph and plasma and forms a loose combination with the hemoglobin of the blood corpuscles. The *function* of the oxygen in the body appears to be the oxidation of albuminous, oleaginous, and saccharine compounds to their ultimate forms, urea, carbonic acid, water, etc. As to whether this is brought about by direct oxidation or by a fermentative process is yet unknown. As oxygen only enters into combination under a high temperature, it is assumed that it exists in the body under the form of ozone, O_3, which possesses remarkably active oxidizing powers. The seat of oxidation is at present located in the tissues, as the presence of ozone in the blood has not been positively demonstrated.

Hydrogen is also a constituent element of almost all the compounds of the body; it exists in a free state in the intestinal tract, where it is produced by a decomposition of organic substances; it is also produced within the tissues as a result of chemical changes. Its function is unknown, though it is asserted by Hoppe-Seyler that hydrogen unites with neutral oxygen, O_2, in the tissues, forming water and liberating oxygen in the nascent state, which becomes the oxidizing agent.

[1]From Brubaker's Human Physiology, published by P. Blakiston Son's Co., Philadelphia.

Water is an essential constituent of all the tissues of the body, constituting about 60 per cent. of the entire body weight. It is introduced into the body in the form of drink and as a constituent of all kinds of food. The average quantity consumed daily is about four pints. While in the body, water acts as a general solvent, gives pliability to various tissues, and promotes the passage of inorganic and organic matters through animal membranes. It also promotes chemical changes which are essential to absorption and assimilation of food and the elimination of products of waste. It is probable that water is also formed within the body by the union of oyygen with the surplus hydrogen of the food. It is eliminated by the skin, lungs, and kidneys.

Sodium chlorid is present in all the solids and fluids of the body, with the exception of enamel. It regulates osmotic action, holds the albuminous principles of the blood in solution, and preserves the form and consistence of blood corpuscles and the cellular elements of the tissues by regulating the amount of water entering into their composition.

Calcium phosphate is the most abundant of all the inorganic principles with the exception of water, and is present to a great extent in bone, teeth, muscles, and milk. It gives the requisite consistency and solidity to the different tissues and organs. In the blood, it is held in solution by the albuminous constituents. 25 gr. thrown off daily.

The *sodium* and *potassium phosphates* are present in most of the solids and fluids, and give to them their alkaline reaction. They are chiefly derived from the food.

II. ORGANIC NON-NITROGENIZED PRINCIPLES.

The organic non-nitrogenized principles are derived mainly from the vegetable world, but are also produced within the animal body. They are divided into: 1st, the *carbohydrates,* comprising starch and sugar, bodies in which the oxygen and hydrogen exist in the proportion to form water, the amount of carbon being variable; 2d, the *fats,* bodies having the same elements entering into their composition, but with the carbon and hydrogen increased and the oxygen diminished in amount; 3d, *fatty acids;* 4th, *alcohols.*

THE SUGAR GROUP.

Dextrose Group.	*Cane-sugar Group.*
Dextrose (*Glucose,* grape sugar).	Saccharose (cane sugar).
Levulose.	Maltose.
Galactose.	Lactose.

The members of the dextrose group have a composition as follows: $C_6H_{12}O_6$, and are frequently spoken of as monosaccharids. The members of the cane-sugar group have a composition as follows: $C_{12}H_{22}O_{11}$, and are frequently spoken of as di-saccharids.

Dextrose has been found in many of the tissues and fluids of the body as a normal constituent. As it is readily assimilable, it is probable that under this form the carbohydrates are absorbed into the blood. As its name implies, it rotates the plane of polarized light to the right.

Levulose is found in the stomach and intestine, and occasionally in the urine. It is formed by a decomposition of saccharose. While resembling dextrose in many respects, it differs from it in rotating the plane of polarized light to the left.

Galactose can be obtained from brain substance by the action of boiling sulphuric acid and by the decomposition of lactose. It is also dextro-rotatory.

Saccharose is the form of sugar largely consumed as food. It is largely distributed throughout the vegetable kingdom in the juices of fruits and plants. It is not found, however, as a constituent of any of the fluids or solids of the body. During its passage through the stomach and intestine it is converted by the action of ferments into equal parts of dextrose and glucose by the assumption of a molecule of water. Cane sugar is, therefore, not absorbed under its own form, as it is non-assimilable, appearing in the urine after its injection into the blood.

Maltose is the final product formed by the action of saliva and pancreatic juice on starch paste. It is also non-assimilable, and is, probably, converted into dextrose after or during absorption.

Lactose is the form of sugar naturally present in milk. It resembles the two preceding forms in being non-assimilable and non-fermentable.

Glycogen is the only form of starch found as a constituent of the animal tissues. It is closely related to the sugars. Liver sugar.

The sugar of the body is derived from the food. After being converted into dextrose in the alimentary canal, it is absorbed into the blood by the veins of the portal system, and for the most part stored up in the liver under the form of glycogen. When the tissues require sugar for the performance of their normal activities, it is returned to the circulation and carried to all portions of the body. Whatever the intermediate stages may be, sugar is ultimately oxidized, contributing to the production of heat. It is eliminated under the forms of CO_2 and H_2O.

THE NEUTRAL FAT GROUP.

Palmitin.
Stearin.
Olein.

The *Neutral fats,* when combined in proper proportions, constitute a large part of the fatty tissue of the body; they are soluble in ether, chloroform, and hot alcohol; insoluble in cold alcohol and water, and liquefy at a high temperature; when a neutral fat is subjected to a high temperature in the presence of water and an alkali, it is decomposed, with the assimilation of the elements of water, into a fatty acid and glycerin. The fatty acid combines with the alkali and forms an oleate, palmitate, or stearate, according to the fat used. A similar decomposition of the neutral fats is said to take place in the small intestine during digestion. When thoroughly mixed with pancreatic juice, the fats are reduced to a condition of ***emulsion,*** a state in which the fat is minutely subdivided and the small globules held in suspension.

THE FATTY ACID GROUP.

Palmitic acid.	Propionic acid.
Stearic acid.	Butyric acid.
Oleic acid.	Caproic acid.

The *Fatty acids,* combined with sodium, potassium, and calcium, are found as salts in various fluids of the body, such as blood, chyle, feces, etc. Phosphorized fats in nervous tissue, butyric acid in milk, propionic acid in sweat, are also constituents of the body.

The fats are derived from the food, both animal and vegetable. They are deposited in the form of small globules in the cells of the different tissues, are suspended in various fluids, are

deposited in masses in and around various anatomical structures and beneath the skin. Independent of the fat consumed as food, there is good experimental evidence that fat is also produced within the animal body from a partial decomposition of the albuminous compounds. Fat serves as a non-conductor of heat, gives roundness and form to the body, and protects various structures from injury. The fats are ultimately oxidized, thus giving rise to heat and force, and are finally eliminated as carbonic acid and water.

THE ALCOHOL GROUP.

Glycerin. Cholesterin. Alcohol.

Glycerin is chemically a triatomic alcohol in combination with the neutral fats of the body. During pancreatic digestion it is set free. It is supposed by many physiologists to be directly concerned in the production of glycogen. *Cholesterin* is a crystallizable substance largely present in the bile, though it is found in other fluids and solids. It is supposed to be a waste product of nervous matter. *Alcohol* has been found in the urine. It is supposed to be the result of an alcoholic fermentation in the intestine.

III. ORGANIC NITROGENIZED PRINCIPLES.

The *nitrogenized or proteid compounds* are organic in their origin, being derived from the animal and vegetable world; they are taken into the body as food, appropriated by the tissues, and constitute their organic basis; they differ from the non-nitrogenized substances in not being crystalline, but amorphous, in having a more complex but just as definite composition, and containing, in addition to C. O. H., nitrogen, with, at times, sulphur and phosphorus. The proteids possess characteristics which distinguish them from all other substances: viz., a *molecular*

mobility, which permits *isomeric* modifications to take place with great facility; a *catalytic influence,* in virtue of which they promote, under favorable conditions, chemical changes in other substances; e. g., during digestion, salivin and pepsin cause starch and albumin to be transformed into sugar and albuminose respectively. Different proteids possess varying proportions of water, which they lose when subjected to desiccation, becoming solid; but upon exposure to moisture they again absorb water, regaining their original condition—they are *hygroscopic.* Another property is that of *coagulation,* which takes place under certain conditions: *e. g.,* the presence of mineral acids, heat, alcohol, etc.

After death the nitrogenized compounds undergo *putrefactive* changes, give rise to carburetted and sulphuretted hydrogen and other gases. In order that these changes may take place it is essential that certain conditions be present: viz., *atmospheric air* or some fluid containing oxygen, *moisture,* and a *temperature* varying between 60° and 90° F. The cause of the putrefactive change is the presence of a minute unicellular organism, the *bacterium termo.*

The nitrogenized bodies found in the organism are quite numerous, and although they resemble each other in many particulars, there are yet important differences; they can be arranged into the following groups:—

1. NATIVE ALBUMINS.—Proteid bodies soluble in water, many acids, and usually in alkalies; coagulable at a temperature of from 140° to 163° F.
   - *a. Serum Albumin,* the principal form of albumin found in the animal fluids and solids.
   - *b. Egg Albumin,* not found in ordinary tissues, but present in white of egg.

2. GLOBULINS.—Proteid bodies insoluble in water, but soluble in solutions of sodium chlorid.
   a. *Globulin,* found in many tissues, but largely present in crystalline lens.
   b. *Myosin,* found in the muscles in life in a fluid condition; after death it undergoes coagulation, giving rise to the rigidity of the muscles.
   c. *Paraglobulin,* present in blood and obtained from it by passing a stream of carbon dioxid through it; it is also precipitated by adding sodium chlorid.
   d. *Fibrinogen,* present in serous fluid and blood, and can be precipitated by the prolonged use of carbon dioxid; it is also precipitated by the addition of 12 to 16 per cent. of sodium chlorid.
3. DERIVED ALBUMINS.—Proteid bodies which are not coagulable by heat; insoluble in pure water and in salt solutions; soluble in both acid and alkaline solutions.
   a. *Acid Albumin,* found principally in the stomach during first stage of digestion, the result of the action of the hydrochloric acid upon the albumin of the food.
   b. *Alkali Albumin,* found in the intestine during pancreatic digestion, the result of the action of alkalies upon the albumin of the food.
   c. *Casein,* the chief proteid of milk; it is precipitated by acetic acid and rennet.
4. PEPTONES.—These bodies are formed in the stomach and intestinal tract by the action of the gastric and pancreatic juices upon the albumins of the food. They are very soluble in water, alkaline and acid solutions; non-coagula-

ble by heat; very diffusible. They are precipitated by tannic acid and alcohol.

5. ALBUMINOIDS.—The albuminoids are the results of various modifications of albumins occurring during the nutritive process, as well as by the action of various external influences.
   a. *Mucin,* the characteristic ingredient of mucus secreted by the mucous membranes, giving to it its viscidity.
   b. *Chondrin,* found in cartilage.
   c. *Gelatin,* found in connective tissue, tendons, ligaments, bones, etc.
   d. *Elastin,* found in elastic tissue.
   e. *Keratin,* found in skin and epidermic appendages, nails, hair, horn, etc.
6. FIBRIN.—A filamentous albumin obtained by washing blood clots. It is insoluble in water and mineral acids.

As the properties of the compounds formed by the union of elements are the resultants of the properties of the elements themselves, it follows that the ternary substances, sugars, starches, and fats, possess a great inertia and a notable instability; while in the more complex albuminous compounds, in which sulphur and phosphorus are united to the four chief elements, molecular mobility, resulting in isomerism, exists in a high degree. As these compounds are unstable, of a greater molecular mobility, they are well fitted to take part in the composition of organic bodies, in which there is a continual movement of composition and decomposition.

IV. PRINCIPLES OF WASTE.

Urea,	Xanthin,	Sodium,	Urates.
Creatin,	Tyrosin,	Potassium,	
Creatinin,	Hippuric Acid,	Ammonium,	
Cholesterin,	Calcium Oxalate,	Calcium,	

These principles, which represent waste, are of organic origin, arising within the body as products of disassimilation or retrograde metamorphosis of the tissues; they are absorbed by the blood, carried to the various excretory organs, and by them eliminated from the body.

CHAPTER III.

CLASSIFICATION OF FOODS—THEIR SOURCES—COMPOSITION—TABLES.

Foods may be classified in various ways:

a. According to *Source,* as animal, vegetable, and mineral (including oxygen for combustion).

b. According to *Chemical Composition,* as organic and inorganic, the organic foods being further subdivided into nitrogenous and non-nitrogenous substances.

c. According to *Function,* as tissue-formers, or body-builders; energy (or work and heat) producers; and regulators of body processes.

Classification according to Chemical Composition

- Organic
  - Nitrogenous—Proteins
  - Non-nitrogenous
    - Carbohydrates
      - Sugars
      - Starches
    - Fats
- Inorganic
  - Mineral Matter
  - Water

Classification according to Function

- Tissue-formers or body-builders
  - Proteins
  - Mineral Matter
  - Water
- Energy or Work and Heat Producers
  - Carbohydrates
  - Fats
  - Proteins
- Regulators of Body Processes
  - Mineral Matter
  - Water

Important Sources of Proteins:

Milk, eggs, meat, fish, cheese, beans, peas, lentils, some nuts and cereals.

Important Sources of Fats:

Olive oil, butter, cream, bacon and other fat meat, and nuts.

Important Sources of Carbohydrates:

Cereals, and cereal products; sago, tapioca; starchy vegetables, such as potatoes; sugar, honey, sweet dried fruits.

Important Sources of Mineral Matter:

a. Available in organic form:

Nitrogen,—supplied by protein.

Phosphorus,—in milk and cream, eggs (especially the yolk), meat, whole wheat, oatmeal, dried peas and beans.

Iron,—in eggs (especially the yolk), meat, whole wheat, oatmeal, dried and fresh peas and beans, spinach, raisins and prunes.

b. Available in organic or inorganic form:

Calcium, in milk, dried beans and peas, oranges, spinach, turnips; other fresh fruits and vegetables, and whole grains.

Magnesium, potassium, iodin, etc.—likely to be adequately supplied if the other ash constituents are provided for. The addition of sodium chloride (common salt) as a condiment usually supplies a surplus of sodium and chlorin.

TABLE SHOWING THE CHEMICAL COMPOSITION OF SOME COMMON FOOD MATERIALS.[1]

FOOD MATERIALS	Proteid per cent.	Carbohydrates per cent.	Fat per cent.	Water per cent.	Mineral Matter per cent.	Fuel Value per pound calories
Cooked beef roasted	22.3	0	28.6	48.2	1.3	1620
Cooked round steak	27.6	0	7.7	63.0	1.8	840
Tenderloin steak broiled	23.5	0	20.4	54.8	1.2	1300
Dried beef, canned	39.2	0	5.4	44.8	11.2	960
Stewed kidneys, canned	18.4	2.1	5.1	71.9	2.5	600
Lamb chops broiled	21.7	0	29.9	47.6	1.3	1665
Roast leg lamb	19.4	0	12.7	67.1	0.8	900
Roast leg mutton	25.9	0	22.6	50.9	1.2	1420
Smoked ham, fat	14.8	0	52.3	27.9	3.7	2485
Roast Turkey	27.8	0	18.4	52.0	1.2	1295
Fricassed chicken	17.6	2.4	11.5	67.5	1.0	855
Cooked bluefish	26.1	0	4.5	68.2	1.2	670
Broiled Spanish mackerel	23.2	0	6.5	68.9	1.4	715
Canned salmon	21.8	0	12.1	63.5	2.6	915
Canned sardines	23.0	0	19.7	52.3	5.6	162
Fresh round clams	6.5	4.2	0.4	86.2	2.7	215
Fresh oysters	6.0	3.3	1.3	88.3	1.1	230
Boiled eggs	13.2	0	12.0	73.2	0.8	765
Butter	1.0	0	85.0	11.0	3.0	3605
Full cream cheese	25.9	2.4	33.7	34.2	3.8	1950
Milk	3.3	5.0	4.0	87.0	0.7	325
Boiled rice	2.8	24.4	0.1	72.5	0.2	525

[1]Chittenden: "Nutrition of Man," pp. 7-10.

FOOD MATERIALS	Protein per cent.	Carbohydrates per cent.	Fat per cent.	Water per cent.	Mineral Matter per cent.	Fuel Value per pound calories
Brown bread	5.4	47.1	1.8	43.6	2.1	1050
Wheat bread rolls...	8.9	56.7	4.1	29.2	1.1	1395
Whole wheat bread..	9.4	49.7	0.9	38.4	1.3	1140
Soda crackers.....	9.8	73.1	9.1	5.9	2.1	1925
Ginger bread.....	5.8	63.5	9.0	18.8	2.9	1670
Lady fingers.....	8.8	70.6	5.0	15.0	0.6	1685
Sponge cake.....	6.3	65.9	10.7	15.3	1.8	1795
Apple pie.....	3.1	42.8	9.8	42.5	1.8	1270
Tapioca pudding....	3.3	28.2	3.2	64.5	0.8	720
Cooked beets	2.3	7.4	0.1	88.6	1.6	185
Dried peas	24.6	62.0	1.0	9.5	2.9	1655
Boiled potatoes	2.5	20.9	0.1	75.5	1.0	440
Fresh tomatoes	0.9	3.9	0.4	94.3	0.5	105
Baked beans, canned.	6.9	19.6	2.5	68.9	2.1	600
Apples	0.4	14.2	0.5	84.6	3.0	290
Bananas, yellow.....	1.3	22.0	0.6	75.3	0.8	460
Oranges	0.8	11.6	0.2	86.9	0.5	240
Peaches	0.7	9.4	0.1	89.4	0.4	190
Strawberries	1.0	7.4	0.6	90.4	0.6	180
Almonds	21.0	17.3	54.9	4.8	2.0	3030
Peanuts	25.8	24.4	38.6	9.2	2.0	2560
Pine nuts	33.9	6.9	49.4	6.4	3.4	2845
Brazil nuts	17.0	7.0	66.8	5.3	3.9	3265
English walnuts	16.6	16.1	63.4	2.5	1.4	3285

TABLE SHOWING AVAILABLE AND UNAVAILABLE NUTRIENTS.

Name of Food	Inedible Portion	Edible Portion					
		Water	Unavailable nutrients	Available nutrients			
				Proteid	Fat	Carbohydrates	Minerals
	%	%	%	%	%	%	%
Apples	25	84.6	1.6	.3	.5	12.8	.2
Bananas	35	75.3	2.7	1	.5	19.9	.6
Beans (dried)	..	12.6	7.5	15.8	1.6	59.9	2.6
Beef (round)	7.2	65.5	1.6	19.7	12.9	...	.8
Beef[1]	13.3	60.6	1.8	17.9	19.2	...	.8
Bread (white)	..	35.3	3.3	7.1	1.2	52.3	.8
Bread (graham)	..	35.7	3.4	6.9	1.6	51.3	1.1
Breakfast food[2]	..	9.6	4.5	9.3	1.6	74	1
Butter	..	11	4.9	1	80.8	...	2.3
Cabbage	15	91.5	.7	1.2	.3	5.5	.8
Candy	..	...	4	...	...	95	1
Cheese	..	34.2	3.4	25.1	32	2.4	2.9
Corn meal	..	12.5	4	7.5	1.7	73.5	.8
Corn (canned)	..	76.1	1.7	2.1	1.1	18.3	.7
Eggs (boiled)	11.2	73.2	1.2	12.8	11.4	...	.6
Filberts	52	3.7	10.7	13.3	58.8	11.7	1.8
Fish[3]	54.8	76.7	1	20	1.6	...	.9
Fish (salt cod)	24.9	53.5	6.8	20.9	.3	...	18.5
Fowl[4]	25.9	63.7	1.6	18.7	15.5	...	.8
Liver	7	71.2	1.2	20.4	4.3	1.7	1.2
Milk (whole)	..	87	.5	3.2	3.8	5	.5
Milk (skimmed)	..	90.5	.3	3.3	.3	5.1	.5
Mutton (loin)	16	50.2	2.4	15.5	31.4	...	.6
Oatmeal (dry)	..	7.8	5.6	13.4	6.6	65.2	1.4
Oysters (solid)	..	83.3	.6	5.8	1.2	3.3	.8
Peanuts	25	9.2	10.7	21.9	34.7	22	1.5
Peas (green)	45	74.6	2.2	2.5	.5	16.7	.8
Pork (fresh loin)	19.7	5.2	2.2	16.1	28.6	...	.8
Pork (salt ham)	13.6	40.3	3.6	15.8	36.9	...	3.6
Potatoes (white)	20	78.3	1.4	1.7	.1	17.7	.8
Potatoes (sweet)	20	69	2.1	1.3	.6	26.2	.8
Prunes (dried)	15	22.3	8.3	1.6	...	66.1	1.7
Raisins (dried)	10	14.6	9.1	2	3	68.7	2.6
Rice	..	12.3	3.7	6.5	.3	76.9	.3
Strawberries	5	90.4	1	.8	.5	6.8	.5
Sugar	..	...	..	...	...	100	..
Tomatoes	..	94.3	.4	.7	.4	3.8	.4
Watermelon	60	92.4	.9	.3	.2	6	.2

[1](Tenderloin).
[2](Wheat).
[3](Black bass, whole).
[4](Chicken, feathers removed).

APPROXIMATE TIME NEEDED FOR THE DIGESTION OF SOME PRINCIPAL FOODS.

Beef, boiled	3 hours
Beef, roasted	3 to 4 hours
Beef, smoked	4 to 5 hours
Fish, boiled	1½ to 2½ hours
Oysters (raw)	2 hours
Lamb	2½ hours
Mutton, boiled	3 hours
Mutton, roasted	3 to 3½ hours
Milk	2 hours
Sweetbread	2 hours
Ham, boiled	2 to 3 hours
Pork, roasted	5 hours
Poultry, boiled or roasted	2½ to 4 hours
Goose, roasted	4 to 5 hours
Tripe	1 hour
Veal (as prepared in the British Isles)	4½ hours
Eggs, raw	2 hours
Eggs, fried or boiled hard	3 to 3½ hours
Cheese	3 to 4 hours
Apples	3 to 4 hours
Cabbage	3½ to 4 hours
Carrots	3 to 3½ hours
Potatoes	2½ to 3½ hours
Turnips	3½ to 4 hours
Rice, if completely cooked	1 to 2 hours
Sago, if completely cooked	1 to 2 hours
Tapioca, if completely cooked	1 to 2 hours
Wheaten Bread	3 to 4 hours

An ordinary dinner is completely digested, leaving the stomach empty, in four to five hours.

FOODS AND THEIR IRON CONTENT.

In view of the experiments that have tended to show that iron in inorganic form is slightly if at all absorbed, it is of value for the physician to know the foods that are especially rich in this element. Then again many patients have an idiosyncracy against iron in any of its medicinal forms. Clinical experience has shown that many cases of the simple, mild anemias can be promptly overcome by open air living, judicious exercise, careful adjustment of the hygiene, and the feeding of ample quantities of the iron carrying foods.

A recent writer in *Good Health* gives the following suggestions regarding the foods especially desirable in arranging a dietary for an anemic patient because of the iron contained.

Rice contains one grain of iron per pound, or more than the daily body requirement.

Lentil flour contains four grains of iron per pound, or more than four times as much as rice, or eight times the daily body requirement.

Spinach is one of the richest of all foods in iron, containing more than four grains to the pound.

Fine flour bread contains but one-fourth as much iron as rice, and beans two-thirds as much.

Notwithstanding the close relation of the bean to the lentil as a legume, it contains only one-sixth as much iron as does the lentil.

The potato is exactly on a par with the bean in its iron content, furnishing only two-thirds as much iron as does rice.

The yolk of egg contains a little more iron than does rice.

Lettuce contains a little less than rice.

The apple contains about one-third as much as rice—that is, one-third of a grain to the pound.

Barley flour contains half as much iron as does rice.

Oatmeal contains twice as much as rice.

Milk contains only one-fiftieth as much iron as rice—that is, one-fiftieth of a grain to the pound—the least of any food. To get the necessary daily amount of iron from milk, it would be necessary for one to take, then, the enormous quantity of twenty-five pints of milk a day, or more than three gallons.

This curious deficiency of iron in milk is accounted for by the fact that the new-born animal, whether human infant or calf, contains, stored up in its liver, a large amount of iron which has been accumulated from the mother's blood—the liver of an infant contains ten times as much iron as that of an adult. This store of iron appears to be drawn upon to supply the needs of the body during the period for which milk constitutes the natural but temporary food supply.

CHAPTER IV.

DIGESTION—ENZYMES AND FERMENTS—PRODUCTS OF DIGESTION—TOXINS.

When food is taken into the mouth, the salivary glands begin to work more rapidly, and the ptyalin in the saliva at once attacks the starch and begins to change it to malt sugar. At the best there is not much time for digestion in the mouth, and by eating slowly we not only give the ptyalin more time to work on the starch, but we also give the glands more time to secrete the ptyalin, and we mix the ptyalin more thoroughly with the food. All this increases starch digestion in the mouth, or at least insures the admixture of a larger amount of saliva with the food.

The food remains in the stomach from one to four hours. The main digestion carried on here is that of the proteids by the pepsin of the gastric juice. This enzyme splits the proteid molecules into smaller molecules called *peptones,* which thus become freely soluble. The stomach keeps working the food along, and especially in its lower part keeps mixing the gastric juice with it. After about an hour the pylorus opens and lets the more liquid part of the food pass on into the intestine. The pepsin continues its work on the food remaining in the stomach, which as it is sufficiently digested, is ejected from time to time into the intestine. The acid in the gastric juice stops the action of the ptyalin on the starch, but in the upper part of the stomach the acid sometimes takes an hour to work all through the food. There is, therefore, more or less starch digestion carried on by the ptyalin after the food leaves the mouth.

When the food passes into the small intestine, the glands of the intestines secrete their juices, the gall-bladder contracts and sends the stored-up bile into the duodenum, and the pancreas begins to send in the pancreatic juice with its three powerful enzymes—trypsin, amylopsin, and steapsin. Then the following enzymes finish the digestion of the foods:

Amylopsin changes the starches which escape the ptyalin into malt sugar. Then each molecule of malt sugar, and also the cane sugar (ordinary sugar) that we take in our food, is split by enzymes in the intestinal juice into grape sugar. Thus all the starches and sugar are finally changed by digestion into grape sugar.

The enzyme that digests malt sugar is called *maltase.* The enzyme that digests cane sugar is called *invertase.*

The intestinal and pancreatic enzymes, like the ptyalin, cannot work when strong acids are present. Both the bile and the pancreatic juice contain minerals that unite with and destroy the acid of the gastric juice.

Trypsin digests the proteids which have escaped the pepsin.

Steapsin digests the fats. Bile is not a digestive fluid, for it contains no enzymes; but it assists in destroying the acids of the gastric juice, assists the steapsin in the digestion or emulsifying the fats, and materially promotes their absorption.

The following table gives all essential information as to the source, character, action of the principal digestive ferments:

TABLE OF ENZYMES, THEIR SOURCE AND ACTION.

Part of Alimentary Tract	Name of Secretion	Reaction to Litmus	Enzymes Present	Food Principles Acted Upon	Products of Enzyme Action
Mouth	Saliva	Alkaline	Ptyalin	Starch	Soluble Starch-Dextrins Maltose
			Maltase	Maltose	Dextrose
Stomach	Gastric Juice	Acid (0.2%—0.4% H Cl.)	Pepsin	Proteins	Acid Protein Proteoses Peptones
			Rennin	Protein (especially casein of milk)	Coagulated Protein
			Lipase	Emulsified Fats	Fatty acids and glycerine
Small Intestines	Pancreatic Juice	Alkaline	Trypsin	Proteins	Alkali Protein Proteoses Peptones
			Steapsin	Fats	emulsified Fat— Fatty acids and glycerine
			Amylopsin	Starch	Soluble Starch— Dextrins— Maltose
			Lactase (in young animals)	Lactose (Milk Sugar)	Dextrose and Galactose
	Intestinal Juice	Alkaline	Erepsin	Proteins in the form of Proteoses and Peptones	Amino Acids
			Sucrase	Sucrose	Dextrose and Levulose
			Maltase	Maltose	Dextrose
			Lactase	Lactose	Dextrose and Galactose

The bile contains no important enzymes, but greatly facilitates the digestion of fats. The intestinal juice contains an enzyme which makes trypsin an active enzyme, and a substance which helps to stimulate the flow of pancreatic juice.

THE ACTION OF FOODS ON THE DIGESTIVE GLANDS.

In connection with study of the action of the enzymes it is interesting to note the effect which certain articles of food have on the secretion and activity of these important substances, as has been pointed out.

A special adaptation to food is seen in all the digestive secretions, and is well shown in the salivary glands. A copious watery secretion is evoked by the presence of dry food in the mouth, but a thick mucoid secretion is passed out on moist particles of tasty food; an example of the adaptable nature of the secretion. The watery saliva moistens dry food, the mucoid secretion welds the food into a bolus, preparatory to its being swallowed. The character and nature of the gastric secretion also depend on the nature of the food. A rapid secretion of effective juice is poured out on flesh, a scanty secretion on bread, and a delayed flow of gastric juice on milk.

The delayed secretion in the case of milk is due to the fat contained therein. Fat inhibits gastric secretion. The secretion evoked by the ingestion of milk is found to be the weakest gastric juice of all, and in addition, the pancreatic juice secreted is the least in amount. That is, when an equivalent quantity of nitrogenous food is given as flesh, bread or milk, the least secreting activity is evoked in the case of milk. The secretion poured out on milk is effective, but at the same time economic. The importance of milk as a food is apparent from this, and particularly when economy of digestive gland activity is important, as, for instance, in certain gastro-intestinal diseases.

CHAPTER V.

MILK—GENERAL CONSIDERATIONS—ITS VALUE IN FEEDING THE SICK—INCIDENTAL DATA.

Milk, says Pattee, is the only substance in nature designed expressly for the nourishment of the young animal. It contains all the compounds necessary to support life, in remarkably good proportions and in very assimilable forms. It is a perfect food for infants, and is specially suited to the needs of certain classes of invalids and sedentary persons. For the active adult it is undesirable as the sole article of diet, because the proportion of water is so high that large quantities have to be taken to supply the necessary energy; because the proportion of protein is unnecessarily high; and because it furnishes no indigestible residue upflow to supply bulk for the perfect functioning of the intestines.

Composition. Milk contains the five food principles, the proportions varying somewhat with different species, and also with individuals of the same species. Cow's milk, which is most extensively used, is the kind which will be mainly considered here. Milk has a specific gravity of 1.027 to 1.035.

The chief ingredient is water, which averages 87 per cent. The solid matter is made up of proteins, fats, carbohydrates and mineral matter. The average percentages are as follows: Protein, 3.3 per cent.; fat, 4 per cent.; carbohydrates, 5 per cent; mineral matter, 0.7 per cent.

The principal protein is casein, a compound containing both phosphorus and sulphur. Casein is precipitated (or coagulated) by the addition of acid, or in neutral solutions, by rennet. Milk

also contains lactalbumin, which averages about 1/7 of the total protein. The character of the curd depends largely on the relative proportions of casein and lactalbumin.

The fat of milk varies widely in amount. It is found throughout the milk in globules, i. e., as an emulsion. On standing, the fat rises to the top and forms cream. Chemically, several fats are present, chiefly stearin, palmitin and olein, with smaller amounts of others, which give the characteristic flavor to butter. The chief carbohydrate is lactose or milk sugar. This remains in the whey when the casein and fat are removed.

The ash constituents are mainly phosphates and chlorides of calcium, sodium and potassium.

TABLE SHOWING COMPOSITION OF THE MILK OF DIFFERENT ANIMALS.

Animal	Water	Solids	Fat	Casein	Albumin	Milk Sugar	Ash
Woman	87.4	12.6	3.8	1.0	1.3	6.2	0.3
Cow	87.2	12.8	3.7	3.0	.5	4.9	.7
Goat	85.7	14.3	4.8	3.2	1.1	4.4	.8
Buffalo	81.4	18.6	7.5	5.8	.3	4.1	.9
Ewe	80.8	19.2	6.9	5.0	1.5	4.9	.9
Llama	86.5	13.5	3.2	3.0	.9	5.6	.8
Mare	91.5	8.5	1.2	1.2	.1	5.7	.3
Ass	89.6	10.4	1.6	.7	1.6	6.0	.5
Camel	86.6	13.4	3.1	4.6	4.0	5.6	.7
Sow	84.0	16.0	4.0	7.2	7.2	3.1	1.1
Elephant	67.9	32.1	19.6	3.1	3.1	8.8	.6
Porpoise	41.1	58.9	45.8	11.2	11.2	1.3	.6
Dog	75.4	24.6	9.6	6.1	5.1	3.1	.7
Cat	82.1	17.9	3.3	3.1	6.0	4.9	.6

TABLE SHOWING FOOD CONSTITUENTS OF DIFFERENT MILKS.

Animal	Protein	Fat	Milk Sugar	Mineral Matter
Woman	1.6	3.4	6.1	0.2
Goat	3.7	4.3	3.6	0.8
Cow	3.5	3.7	4.9	0.7
Ewe	4.9	9.3	5.0	0.8
Mare	2.0	1.2	5.7	0.4
Ass	2.2	1.6	6.0	0.5
Camel	4.0	3.1	5.6	0.8
Reindeer	10.4	17.1	2.8	1.5

It will be seen that all the animals included in the above tables, which comprise the principal species that have been kept wholly or partly for their milk, yield milk that is much richer than woman's milk in the muscle-forming element, protein. If we were choosing a milk for this one quality, says Spargo,[1] chemical analysis would indicate the wisdom of selecting the milk of either the mare or the ass, which are nearest to woman's in that one particular. But when we consider these with regard to the percentage of fat contained in them, they are seen to be very notably deficient. Strangely enough, the milk of the camel and the cow are about equally near mother's milk, the slight deficiency of fat in the first being about the same as the slight excess in the second. Next in order comes goat's milk, so that we may value them in the following order: (1) cow's milk; (2) camel's milk; (3) goat's milk. In carbohydrates all three are notably deficient, but the camel is nearest, with the cow second and the goat third.

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[1]The Common Sense of the Milk Question, by John Spargo, published by MacMillan Co.

TEN WAYS OF MAKING MILK MORE ACCEPTABLE.[1]

If milk disagrees one of the following ways may be tried to render it more digestible: (1) Scald the milk. This is done by placing a jug of milk in a pan of cold water; put it on the fire or gas until the water boils, then lift the jug out of the water and let it cool. (2) Boil it with a little bread (without crust) in it; then strain through muslin. (3) Make it into a junket by adding a teaspoonful of rennet; let this stand, and serve cold with sugar. (4) Mix equal parts of milk and boiling water, and add a small pinch of salt to it. (5) Mix equal parts of milk and thin barley water. (6) Mix two parts milk, one part lime water, and one part barley water. (7) Mix two parts milk and one part whey; to prepare whey make a junket; when set beat it a little with a fork, strain through muslin, and the watery part is whey. (8) Mix two parts milk and two parts albumin water. To prepare albumin water for this heat the whites of two fresh eggs in a pint of cold water. (9) To a pint of milk add 5 to 10 grains of citrate of potash. (10) To a pint of milk add one or more peptonizing tablets; make the milk hot—*i. e.*, about 99° Fahr.; then add the crushed tablets; let it stand ten minutes, then boil it. If the milk is not boiled the peptonizing goes on, and gives the milk a bitter taste.

PREPARATION OF MILK FOR USE.

The recognized dangers of contaminated milk and the difficulty of securing milk with a bacterial content within safe limits have made it necessary to resort to measures like pasteurization and sterilization. Both are makeshifts, for no argument is needed to prove the superior flavor, food value and general utility of pure raw milk. As a writer in *American Medicine*

[1] *British Journal of Nursing.*

said not long ago since it has been shown that pure clean milk is available there is no excuse for anything else. The time is coming when the dairymen are going to be educated to standards of cleanliness and trained in methods of milk gathering that will insure a milk supply that is pure and safe. Then it will be necessary for the municipal authorities in every center to regulate the handling of milk by dealers. All "loose" or milk in bulk will have to be interdicted, for as long as milk is sold in any other than sealed bottles, contamination is certain and contamination means death and disease.

Under present conditions the condition as it actually presents must be met and pasteurization seems the only practical solution.

PASTEURIZATION.

Quoting Pattee again, this is the process by which milk is rendered more or less sterile through destruction of active bacteria by heat. Various standards as to temperature and time have been adopted, but in general the milk is heated to a temperature not exceeding 167° F., for a period of 20 to 45 minutes, and then rapidly cooled to 45° F. or lower. Most harmful bacteria and lactic acid bacteria are killed. Spores are not killed, and if the milk is not kept cold or is allowed to stand too long, putrefactive organisms develop. These putrefactive changes are very undesirable, so that the care of pasteurized milk is just as important as that of fresh milk. If carelessly handled, the fact that it does not sour readily is a menace to health rather than a benefit.

Commercial pasteurization is a cheap and effective means of preventing the spread of ordinary infectious diseases. The degree of heat used does not change materially the flavor nor the

chemical composition of the milk. It does destroy the enzymes naturally present in milk, and how much this affects the value of milk for infants is still unsettled. When clean fresh milk cannot be absolutely insured, it is safer to pasteurize. But this process cannot make bad milk good nor dirty milk clean. If bacteria have already produced poisonous products it will not destroy them.

Directions for Pasteurization.

Pattee gives the following simple yet practical method: Put empty bottles into kettle of cold water and slowly bring to the boiling point. Boil ten minutes. After which fill immediately nearly full with milk; cork with absorbent cotton which has been baked in the oven until a delicate brown. Place bottles on a rest in a deep pan so that they will not touch bottom, and fill the pan with cold water to reach as high as the milk in bottles. Heat water gradually to 155 to 167 degrees Fahrenheit, or until small bubbles appear in the milk next to the glass. Remove to back of stove and keep milk at same temperature 20 to 45 minutes; then cool quickly to 45 degrees or lower. To cool rapidly put bottles first into lukewarm water and then cold water until milk is cold, then surround with ice water. Keep in cold place and do not remove stoppers until ready to use.

STERILIZATION.

Sterilization is accomplished by keeping milk at boiling temperature (212° F.) for 10 or more minutes, preferably in the vessel in which it is to remain. This will kill all living bacteria, but will not destroy spores. Hence to render milk absolutely sterile, repetition of the process on successive days is necessary.

MILK DON'TS.

The following issued by the *Kansas City Health Board Bulletin* are so important that they deserve reprinting as often as possible:

Don't buy milk unless you are sure that it is clean.

Don't expose milk or its container to the sun for an indefinite time.

Don't put milk in a vessel that has not previously been scalded.

Don't cook milk in vessels that are used for other purposes.

Don't keep milk in the same compartment of the refrigerator with other eatables. It should be borne in mind that milk absorbs odors as well as germs.

Don't leave milk bottles uncovered.

Don't let the milk bottles stand unwashed after use. Wash them at once.

Don't fail to rinse the bottle in cold water before scalding.

Don't use any but fresh milk for the baby.

Don't give the baby a milk mixture prescribed by a neighbor.

Don't keep the milk warm all the time. Germs grow.

Don't use a thermos bottle to keep baby's milk warm.

Don't blow the milk to cool it.

Don't heat the milk a second time before feeding it to the baby.

Don't moisten the nipple with your own saliva before putting it into the baby's mouth.

Don't rescue dying flies from the milk and then use the milk. If you are a good housekeeper no flies will get into the milk.

Don't use milk in the baby's sore eye.

Don't drink milk rapidly. It is food and drink, and cannot be digested quickly.

Don't accuse the milk dealer of serving sour milk until you have investigated your own handling of it.

Don't forget that ice is the best preservative for milk—see that it is about the milk bottle or container instead of being used for ice water or eaten by the children.

Better pay three cents a day for ice than $3 for a doctor and medicine.

CHAPTER VI.

INFANT FEEDING—NATURAL OR BREAST FEEDING—ARTIFICIAL —MODIFIED MILK—INFANCY—CHILDHOOD.

The natural food of the new born child is mother's milk and unless there are urgent contraindicative reasons the child should be fed from the mother's breast.

It having been decided that the child is to be nursed by the mother, regular hours of feeding should be established with an interval during the night. The baby should be put to the breast every two hours during the day; at night, say, from ten o'clock untll early the next morning, one to two nursings are usually sufficient.

Fifteen to twenty minutes is ample time to keep the chlld at the breast, and it will often doze off to sleep after nursing.

As the child grows older, the interval between the hours of nursing should be increased, and the number of night feedings diminished in accordance with the table given below:

NURSING INTERVALS.

Age.	*Interval.*	*No. of feedings in 24 hours.*	*No. of night feedings.*
From birth to 4 weeks,	2 hours	10	2
From 4 to 6 weeks,	2 "	9	1 to 2
From 6 to 8 weeks,	2½ "	8	1
From 2 to 4 months,	3 "	6	0
From 4 to 10 months,	3 "	6	0
From 10 to 12 months,	3 "	5	0

SUBSTANCES EXCRETED IN MILK.

Many substances taken by the mother are excreted in the milk. Among these are ammonia and certain aromatic and

volatile oils (such as the oils of anise, cumin, dill, wormwood, garlic, turpentine, and copaiba); the purgative principles of rhubarb, senna, castor oil, and scammony; opium, iodine, antimony, arsenic, bismuth, iron, lead, mercury, and zinc. The therapeutic actions of certain drugs administered to the mother may thus be observed in the child. Among these are opium, mercury, arsenic, potassium iodide, senna, castor oil and some other purgatives.

Substances which increase the flow of milk: Jaborandi, pilocarpine, rich foods, stimulants, and probably thyroid gland substance.

Substances which lessen the flow of milk: White agaric, belladonna, atropine, ergot, potassium iodide, and sodium iodide.

ARTIFICIAL FEEDING.

When the breast milk is scant and of poor quality efforts should be made to improve the mother's general health; should these prove ineffective recourse must be had to artificial feeding. This latter has also to be resorted to in acute fevers, syphilis, tuberculosis and wasting diseases which preclude breast feeding.

Cow's milk is the principal, if not the only food upon which we can depend for the artificial feeding of children, although goat's and asses' milk are much used in some countries.

Cow's milk contains more casein than human milk, in the stomach it coagulates into larger, firmer clots which are but slowly dissolved, it is neutral or acid in reaction while woman's milk is neutral or alkaline, and finally it contains many different bacteria while human milk is sterile.

As cow's milk, although a staple food of nearly all young children, is easily contaminated, its production and handling should be supervised with the greatest care.

In artificial feeding we endeavor to modify the cow's milk so that it will resemble human milk in the proportions of its various elements, and will be assimilated by the infant. Many formulas have been devised for this purpose. The following will be found extremely serviceable:

SCHEME FOR FEEDING BABIES.

SOCIETY OF THE LYING-IN HOSPITAL, NEW YORK CITY.[1]

First Day.—Give from nursing bottles 30 C. C. (1 ounce) of 6 per cent. sugar water every 3 hours, from 6.45 P. M. to 9.45 P. M., inclusive, and if necessary one bottle at 3.45 A. M.

Second Day.—30 to 45 C. C. (1 ounce to 1½ ounces) of Formula No. I in nursing bottle, every 2 hours from 6.45 A. M. to 10.45 P. M., and 3.45 A. M.—ten feedings.

Third Day.—Same as second day.

Fourth Day.—If there is milk in mother's breast, nurse every 2 hours as on second day. If there is no milk in mother's breast, 30 to 45 C. C. (1 ounce to 1½ ounces) of Formula No. II every 2 hours, as on second day.

Fifth and Sixth Day.—For breast fed babies ten feedings as in second day. For bottle fed babies same as fourth day.

Seventh to Fourteenth Days.—For breast fed babies ten feedings. For bottle fed babies 30 to 75 C. C. (1 ounce to 2½ ounces) of Formula No. III for ten feedings.

FORMULÆ.

Sugar Solution 6 per cent.:

Take 30 grams (1 ounce) sugar of milk and dissolve in 500 C. C. (1 pint) boiled water.

[1]Diet used at the Society of the Lying-In Hospital, New York City.

FORMULA No. I.

Fat, 0.5 per cent.; sugar, 6 per cent.; proteid, 0.5 per cent.:

Take 6 per cent. sugar solution, 7 parts.

Plain milk 1 part, 60 C. C. (2 ounces) limewater for every 500 C. C. (1 pint) of food mixture.

FORMULA No. II.

Fat, 1 per cent.; sugar, 6 per cent.; proteid, 0.5 per cent.:

Take 6 per cent. sugar solution, 7 parts; 12 per cent. cream ½ part; milk ½ part.

60 C. C. (2 ounces) lime water for every 500 C. C. (1 pint) of food mixture.

FORMULA No. III.

Fat, 1.5 per cent.; sugar 6 per cent.; proteid 0.5 per cent.:

Take 6 per cent. sugar solution, 7 parts; 12 per cent. cream 1 part. 60 C. C. (2 ounces) limewater for every 500 C. C. (1 pint) of food mixture.

FORMULA No. IV.

Fat, 2 per cent.; sugar 6 per cent.; proteid 0.6 per cent.:

Take 6 per cent. sugar solution, 5 parts; 12 per cent. cream 1 part.

60 C. C. (2 ounces) limewater for every 500 C. C. (1 pint) of food mixture.

FORMULA No. V.

Fat, 2.5 per cent.; sugar, 6 per cent.; proteid, 0.8 per cent.:

Take 6 per cent. sugar solution, 4 parts; 12 per cent. cream 1 part.

60 C. C. (2 ounces) limewater for every 500 C. C. (1 pint) of food mixture.

NOTES.

1. For every 500 C. C. (1 pint) of food mixture add 60 C. C. (2 ounces) of limewater.

2. 12 per cent. cream is the top fifth of a bottle of milk after standing about 5 hours.

3. It is the top 200 C. C. (7 ounces) of 1,000 C. C. (1 quart) of milk after standing about 5 hours.

4. If the milk is of rich quality the top 240 C. C. (8 ounces) can be taken.

5. Up to two weeks the amount of each feeding is 30 C. C. (1 ounce) to 75 C. C. (2½ ounces) according to weight, digestion and capacity.

From two to five weeks the amount of each feeding is 60 C. C. (2 ounces) to 100 C. C. (3½ ounces).

Number of daily feedings 10. From 6.45 A. M. to 10.45 P. M. From 10.45 P. M. to 6.45 A. M., one feeding should suffice.

MILK LABORATORIES.

When it is inconvenient or impracticable to modify the milk at home the physician in the large city may send his formula to certain modified milk laboratories in the same way that he would leave his prescription at the druggist's to be compounded.

The advantages claimed by these laboratories are: 1st. Direct supervision of the milk supply, which is taken from healthy, selected, well cared for and well fed cows. 2nd. The freshness of the milk is not impaired by the process of preparation. 3rd. Scientific modification of the milk, each child having a mixture suited to its digestion and containing the proper amount of fats, sugar and proteids. 4th. Avoidance of all possible errors in the preparation of the milk, by mother or nurse.

As stated previously, the question of sterilizing or pasteurizing milk for infants is still open to discussion, many authorities believing that it is preferable to choose a milk of undoubted purity and give it to the child raw. When there is any doubt, however, pasteurizing certainly affords dependable protection.

Condensed milk from dependable sources is cheap, convenient and highly nutritious. It is apt to impair the digestion, cause fermentation and lead to malnutrition if it contains an excess of sugar. While our ideas on the question of sugar in infant feeding are undergoing great change, the relative quantity of sugar in any artificial or substitute food should always be determined, for on this its availability will often depend. Milk may be attenuated with barley, gelatin, oatmeal or limewater, it may also be combined with any of the reliable proprietary foods. Whole wheat bread and zwieback are often useful and palatable additions to the milk.

When all forms of milk disagree or are for various reasons contraindicated, albumin water, gruels, jellies, broths, soups, or beef-juice may be substituted.

Purées (a valuable combination of milk and vegetable albuminoids), junket (milk curdled by rennet), custard, light rice pudding, blanc mange, sago or tapioca, bread pudding, sponge cake with milk, are important additions to the dietary of the child who is allowed mixed diet.

Fresh eggs, soft boiled or poached, may be given to children, long before meat is permitted. Well baked bread or toast may be eaten with the egg.

It is only after the eighteenth month that the child's digestive organs are prepared to digest and assimilate meat, it is, therefore, a mistake to permit its use before that age.

The importance of fruit as an article of diet for young children is too often overlooked. As early as eighteen months

they may have an ounce or two of orange juice, and later one or two tablespoonfuls of baked apple or two or three stewed prunes, well cooked and the skins removed.

FEEDING OLDER CHILDREN.

A good working formula for a child 18 to 30 months old is:

7 a. m. New milk 8 oz., yolk of a soft boiled egg, two thin slices of bread and butter or else milk and two tablespoonfuls of well cooked oatmeal or wheaten grits with sugar and cream.

10 a. m. Milk 6 oz., soda biscuit or bread and butter.

2 p. m. One tablespoonful of rare mutton pounded to a paste or scraped beef, bread and butter, mashed potatoes moistened with meat juice (dish gravy), a saucer of junket or else a breakfast cupful of beef, mutton or chicken broth, a thin slice of stale bread, a saucer of rice or milk pudding.

6.30 p. m. A breakfast cupful of milk with bread and butter or soft milk toast.

This being merely a type of diet, it should be modified in accordance with the growth of a child, or the activity of its digestive function.

From the third to the sixth year one may allow:

Fresh milk, cream, eggs in any form excepting fried.

Meats: Preferably beefsteak, mutton chop, underdone roast beef or lamb, white meat of chicken, fresh fish boiled or broiled, broths, soups.

Vegetables: Baked potato with cream, beef juice or dish gravy of roast meats. Green vegetables: Asparagus tips, spinach, stewed celery, string beans, fresh peas. Cereals: Oatmeal, wheaten grits, hominy, rice, farina, arrowroot, bread and crackers.

CHAPTER VII.

ALCOHOL IN DIET.

Although its indispensability as a stimulant has been questioned in some quarters, and its use, as a consequence somewhat curtailed, nevertheless it is generally conceded that alcohol possesses food value and when taken in small quantity is completely oxidized in the system. Careful experiments seem to indicate that it retards waste by sparing the wear and tear of tissue-proteids, irrespective of its action on the nervous system.

Consequently its value in febrile conditions and acute wasting diseases is sometimes very great. In fevers it not only repairs the tissue waste coincident to the disease but also sustains the heart and nervous system, and by promoting the loss of excessive heat, thus aids in lowering the temperature.

As a stimulant its principal action is in connection with the heart. It is an available, convenient and rapidly acting agent in heart failure (syncope and fainting). For this purpose brandy or whiskey, pure or diluted, administered by the mouth or hypodermatically are preferable. Small continued doses are often useful in chronic heart affections.

In nervous depression, melancholia (anxiety, overwork, etc.) despondency, neuralgia, hysteria and allied disorders, and sleeplessness the rapidity with which it relieves should make one wary of prescribing it too frequently lest a habit be established.

Its stimulating properties are, however, of service in pneumonia, typhoid fever, erysipelas, puerperal fever, and in nearly all acute diseases of elderly people and cachectics; in a word wherever there is debility and a tendency to collapse.

It has also proven useful in hemoptysis, uterine hemorrhages, and has been recommended by some authorities for children, in capillary bronchitis, broncho-pneumonia, pneumonia and in choleroid forms of diarrhea.

Alcohol is, however, contraindicated in gout, rheumatism, arteriosclerosis, diabetes, dyspepsia with hyperchlorhydria, and in all cases of exaggerated neuroses.

Wines, containing alcohol in variable proportions, have secondary medicinal properties in accordance with their quality; for instance, white wines have a diuretic effect while red wines act as a tonic and are beneficial in debilitated conditions.

Taken at meals, pure or diluted as may be desired, wine develops body heat, aids nutrition and improves the tone of the digestive organs.

The dry wines, which contain little or no sugar, are pleasant to take and are often of benefit to convalescent and enfeebled patients. They are less apt to disturb the digestion than are the heavier sweet wines.

Light table wines, Burgundy, Hock, Rhine wine, often prove of service. However, as the latter contain slight amounts of oxalic acid they are contraindicated in cases in which there is a tendency to the oxalic diathesis.

Malt liquors: Ale, stout, porter and beer have a special tonic effect, and the diastase which they contain aids the digestion of starchy foods. They are apt to cause biliousness in persons of weak digestion, and are certainly fattening when drunk in large quantities. The following are some of the better known alcoholic beverages with their percentage of alcohol:

TABLE OF ALCOHOLIC PERCENTAGES.

Rum	60 to 75
Whiskey	50 to 60
Brandy (British)	50 to 60
Brandy (French)	50 to 55
Gin	48 to 60
Port	18 to 20
Marsala	15 to 21
Sherry	18 to 20
Madeira	14 to 17
Hungarian Wines	9 to 15
Claret	8 to 12
Sauterne	11 to 18
Burgundy	8 to 14
Moselle	8 to 12
Rhine Wines	7 to 16
Chablis	7 to 10
Champagne	6 to 13
Bitter Ale	6 to 9
Cider	2 to 9
Porter	4 to 7
Beer	2 to 4
Ginger Beer (brewed)	1 to 3

CHAPTER VIII.

CALORIC FEEDING—ITS CHARACTER—PURPOSE—PRACTICAL APPLICATION.

Caloric feeding is based on the knowledge that all foods are capable when undergoing combustion or oxidation of generating a definite amount of heat or energy. Since the process of digestion is essentially combustion, the conversion of food material into energy and heat, it will be apparent that the value of food when taken into the economy will largely depend on the extent to which it can be converted into these forces. The energy value of a food is indicated by its heat production, for these bear a definite and constant relation to each other. A unit called the calorie has been devised, therefore, to express different amounts of heat, each unit representing a definite working capacity. For instance, each calorie represents the amount of heat required to raise the temperature of one kilogram of water one degree Centigrade at standard atmospheric pressure.

An instrument devised for the measurement of heat is called a calorimeter. To determine the fuel value of any food material *outside* of the body, a given amount is placed in a calorimeter, where it is burned in an atmosphere of pure oxygen, in a vessel surrounded by water. The heat generated raises the temperature of the water, and the change is observed with a very delicate thermometer. From this the total heat evolved is calculated. To determine the fuel value of this material *within* the body, the average amount which is lost in digestion, or which is not completely oxidized before excretion, is deducted from the fuel value

outside the body. The result is the *physiological fuel value.* Many years ago, Rubner determined averages for proteins, fats, and carbohydrates from experiments on dogs. In recent times, further experiments made in this country on human subjects by Prof. Atwater and his associates have modified these factors somewhat. The following are therefore accepted as the average energy values of food in the body to-day:

1 gram of Protein.....yields 4 Calories
1 gram of Fat.....yields 9 Calories
1 gram of Carbohydrate..yields 4 Calories

Since by careful study of individuals, with careful consideration of weight, energy expended, waste, etc., it is possible to arrive at a fairly definite knowledge of the amount of energy expended during a given period, we can estimate the amount of food required to restore the tissues consumed and thus maintain a nutritional or metabolic balance.

In other words a man of a given weight will while engaged in an active occupation expend a certain amount of energy which of course represents a definite number of heat units or calories.

For many years the dietary standard of Carl Voit, the famous Munich physiologist, says Goodwin Brown, has been accepted as giving the minimum food requirements for a healthy man. This standard calls for 118 grams or 4 ounces of proteid, 56 grams or two ounces of fat, and 500 grams or 16⅔ ounces of carbohydrates with a total fuel value of 3,055 calories daily for a man doing moderate work. For a man doing hard work, the daily requirement is increased to 145 grams or 4⅝ ounces of proteid, 160 grams or 5⅓ ounces of fat, and 450 grams or 15 ounces of carbohydrates with a fuel value of 3,370 calories.

A more recent investigator, Professor W. O. Atwater, places the daily requirement for proteid at 125 grams or 4⅓ ounces, with sufficient fats and carbohydrates to give a total fuel value of 3,500 calories for a man doing moderate work; while for a man at hard work he increases the daily diet to 150 grams or 5 ounces of proteid, with fats and carbohydrates to yield a total fuel value of 4,500 calories.

In order that his body shall not suffer and lose weight it is necessary that any individual take into his economy a quantity of food that will in its heat producing value more than equalize the energy expended as represented by its calories. This necessity for the food calories to be greater than those represented by the energy expenditure is due to the considerable amount of heat lost in the processes of digestion and assimilation, and the essential waste. Thus a food representing 1,500 calories before ingestion might only represent 1,200 calories by the time it reached the remote tissues; if the energy loss was 1,500 calories, it will be seen that the body would still lack 300 calories. So in caloric feeding after determining or estimating the actual bodily needs, a certain excess must be allowed for the processes of metabolism.

The following table will be found of interest and value:

FOODS AND THEIR CALORIC VALUE.*

A list of some of the ordinary articles of diet as prepared for the table in the amounts usually consumed daily, with their dietetic values in grams and calories.

	Article of Food.	*Amount.*		*Proteids.*		*Fats.*		*Carbohydrates.*		*Value in Calories.*
		Ozs.	*Gms.*	*Per Cent.*	*Gms.*	*Per Cent.*	*Gms.*	*Per Cent.*	*Gms.*	
1	Sweet Milk.....(A)	48.	1360.8	3.3	44.88	4.0	54.40	5.0	68.01	936.23
2	Buttermilk ..... "	16.	453.6	3.0	13.61	0.5	2.27	4.8	21.77	161.71
3	Cream ..... "	4.	113.4	2.5	2.84	18.5	20.98	4.5	5.10	218.46
4	Butter ..... "	2.	56.7	1.0	0.57	85.0	48.20			431.20
5	Eggs (6) ..... "	10.	283.5	13.1	37.14	9.3	26.36			383.20
6	Roast Beef .....(L)	1.5	42.5	21.6	9.19	27.2	11.57			139.69
7	Sirloin Steak ..... "	2.5	70.9	22.8	16.16	19.4	13.75			187.00
8	Bacon (crisp) .... "	0.5	14.2	9.6	1.36	64.0	9.09			86.33
9	Ham ..... "	1.5	42.5	15.8	6.72	36.9	15.68			166.41
10	Oatmeal (cooked).. "	3.	85.1	2.3	1.96	0.5	0.43	11.3	9.61	50.05
11	Bread (white) ... "	4.	113.4	9.2	10.43	1.3	1.47	53.1	60.22	295.71
12	Bread (corn) .... "	4.	113.4	6.5	7.47	4.2	4.76	45.2	51.26	277.24
13	Rice (cooked) .... "	3.	85.1	2.3	1.97	0.1	0.09	23.8	20.24	89.59
14	Potatoes (boiled).. "	4.	113.4	1.9	2.15	0.1	0.11	20.0	22.68	100.34
15	Sweet Corn (c)... "	3.	85.1	2.3	1.96	1.0	0.85	19.0	16.16	80.03
16	Peas (cooked).... "	3.	85.1	5.1	4.33	3.1	2.64	14.4	12.25	89.80
17	Beans (baked).... "	3.	85.1	4.8	4.08	2.3	1.96	19.7	16.75	100.75
18	Macaroni (c)	3.	85.1	2.3	1.96	1.4	1.19	15.6	13.27	71.50
19	Spinach (c)	3.	85.1	1.6	1.12	3.7	3.15	2.7	2.30	41.67
20	Tomatoes (raw)...	2.	56.7	0.7	0.40	0.4	0.23	3.8	2.15	12.22
21	Sugar	1.	28.4					100.0	28.35	113.40
22	Nuts (pecans)	2.	56.7	5.2	2.95	33.3	18.88	6.2	3.52	193.89
23	Raisins	1.	28.35	2.3	0.65	3.0	0.85	68.5	19.42	87.85
24	Apple (1)	4.	113.40	0.3	0.34	0.3	0.34	10.8	12.25	53.38
25	Orange "	6.	170.10	0.6	1.02	0.1	0.17	8.5	14.46	63.43
26	Grapes	3.	85.05	1.0	3.40	1.2	1.02	14.4	12.25	61.58

Note.—In the preparation of this table the percentages of proteid, fats, and carbohydrates used are in some instances those employed by Atwater in *Farmers' Bulletin* No. 142, issued by the Department of Agriculture, and in others by Lusk in "The Science of Nutrition." In computing the values in calories, I have considered the amount of nutrient in each article of food available for the body, which, according to Atwater, equals 4 calories for each gram of the proteids; 8.9 calories for each gram of the fats; and 4 calories for each gram of the carbohydrates.

*Prepared by Dr. T. Y. Hull, *Dietetic and Hygienic Gazette.*

From all that has gone before it is evident that caloric feeding enables the practitioner to alter the diet of a patient to a marked degree, eliminating articles or kinds of food that are undesirable, but maintaining a nutritional balance by substituting other foods possessing equal caloric value. The digestion and assimilation have to be carefully considered, however, for it

can easily be understood that failure of the body to digest and appropriate any particular article of food prevents it from affording its caloric value in the economy. The whole scheme is upset and the balance is lost. As a matter of fact, valuable as the study of caloric feeding has proven, and helpful as the application of its principles in the scientific regulation of diet to bodily needs has been found, it is still subject to certain limitations and must ever be more or less circumscribed in its practical aspects. The personal equation is ever present and while accurate knowledge of the caloric value of important foods offers a scientific substitution of one food for another, the reaction of the individual to the substituted food may sooner or later render it not only useless but harmful. Caloric feeding is, therefore, mainly useful for temporary purposes, its principal service being to allow temporary adjustments of the diet to tide a patient over a trying period until the metabolic condition justifies a resumption of the usual or normal diet. This is exemplified in diabetes, rheumatism, obesity or other maladies, where certain foods are essentially to be avoided and yet the demands of the body require that the daily wastes of energy and tissue shall be replaced. A dietetic regimen can be arranged with the objectionable foods eliminated that will furnish the adequate calories. As long as the digestion, assimilation and other details concerned in the metabolic process offer no obstacle, the nutritional balance is maintained. When these fail, however, decline in the nutrition promptly follows. The temporary utility of caloric feeding in the management of disease can hardly be denied. To confer greater value on it in feeding the sick is to lose sight of the manifold details that go to make up the constantly changing problem of the action of foods in the human economy.

In addition to its emergency uses, the caloric method of food valuation provides a convenient, accurate and practical means of estimating the food needs of soldiers, sailors, travellers, explorers, convicts and all those who from their numbers or special problems such as transportation difficulties, etc., need to carry maximum nourishment with minimum bulk. Knowing within fairly exact limits the daily caloric expenditure entailed by varying efforts and labors allows selection of a diet that will supply the requisite calories with the least possible bulk or waste.

Summed up, caloric feeding approaches closer to scientific accuracy in the study of nutrition and dietetics than any system or scheme yet devised. It affords the only practical method of adjusting the diet to bodily needs in definite comprehensive terms. Like everything else, used with regard to practical conditions and an intelligent appreciation of its limitations, caloric feeding has an important place in modern dietetics. But used indiscriminately and blindly, it becomes little more than a fad, with all a fad's possibilities for harm.

CHAPTER IX.

RECTAL FEEDING.

Although rectal feeding has been practiced since the time of Galen its efficacy has not been established, says a writer in the *London Medical Review*. At the outset its limitations must be recognized. It is impossible to nourish the body by means of suppositories, which probably cannot be absorbed at all. In some cases the rectum and colon have been found loaded with them at the necropsy. As the large intestine is the principal place for the absorption of water, it is essential for success with rectal feeding to take advantage of this fact by giving the nourishment in a fluid form. But even in this form its efficacy is open to doubt. The power of the large intestine to digest foodstuffs is very slight. Whether undigested albumin can be absorbed at all is merely of theoretical interest; it is certainly absorbed in much too small an amount to be of any value. Erepsin is the only proteolytic ferment secreted by the intestine. It breaks down proteoses and peptones into simpler bodies, prior to absorption, but can only act on caseinogen and fibrin among the native proteins. As erepsin ordinarily acts after pancreatic juice, we should naturally predigest the proteins by liquor pancreaticus before administering it per rectum. This has a further advantage over merely peptonizing agents in digesting also carbohydrates and fats. Even when the rectal feed is completely pancreatised it is doubtful how far it can be absorbed. Though the large intestine absorbs water readily, food is normally absorbed as completely as it can be in the small intestine, principally by the highly specialized epithelium over the villi. There is no proof that the

widely different epithelium of the large intestine can act in a similar manner. Yet the administration of small nutrient enemata is based on this assumption. It has been claimed that the larger enema will get through the ileo-cecal valve and be absorbed in the small intestine. Church noted in a case of duodenal fistula that some of the soap and water enema reappeared through the opening. Charcoal particles administered in an enema have been found in the stomach. But we cannot rely on this regurgitation as a regular event. Boyd has looked carefully for it by the charcoal method without success. Moreover, only large enemata can be expected to reach as high, and the larger the enema the more difficult it is to retain. Let us turn from *a priori* considerations to actual results obtained.

Absorption of Proteins.—Leube, in 1872, stated that he had been able to maintain life for 6 months on a mixture of meat and pancreas, both chopped very fine and injected by a syringe. Other observers adopting this method found it difficult to carry out and apt to lead to marked putrefactive changes. Ewald used eggs, flour, dextrose and red wine, the last ingredient being recommended because alcoholic solutions are sometimes absorbed when aqueous ones are not, and because of the astringent action of the red wine. According to some authorities the addition of salt is necessary for the absorption of protein. Recent observers have used almost exclusively some of the convenient solutions of peptones on the market. Edsall and Miller using milk and eggs with pancreatic extract found that from 40 to 47 per cent. were absorbed. Huber found about 75 per cent. of peptonised eggs were absorbed, and Bial, in experiments on himself, found an absorption of 50 to 66 per cent. of a solution of peptone. Sharkey, using milk and powdered casein, found an absorption of from 50 to 75 per cent. Figures as high as these suggest that

a comparatively large amount of nourishment can be obtained in this way. However, there is an important source of fallacy; they are based on the amount of protein recovered from the bowel on washing it out. But it is notoriously difficult to remove completely in this way the bowel contents. Even when daily irrigations have been given with scrupulous care, days afterwards a large amount of highly putrid material may be evacuated. Moreover, some of the protein which disappears may have been reduced by putrefactive changes into a form of no nutritive value.

Boyd found that even assuming that all the nitrogen which could not be recovered had been assimilated, nitrogenous equilibrium could not be obtained during rectal feeding, even in those accustomed to a diet poor in nitrogen. He drew the following conclusions: (1) Protein even when digested and with salt is poorly absorbed. (2) The albumin of eggs is an expensive and unsatisfactory food in rectal feeding. We may add that the great liability of eggs to putrefactive change adds much to the nursing difficulties, already great. (3) There is no relation between the amount of protein injected and the amount absorbed. Absorption seems to depend more on the individual capacity than on the amount given.

Absorption of Carbohydrates.—Normally carbohydrates are absorbed by the bowel as dextrose, and of all the foods this appears to be the best utilized in rectal alimentation. Using recovery methods, Deucher found 77% absorbed, while Zehmisch got an absorption of 67.5%. The highest values were obtained by Boyd and Robertson, who, in 2 out of 6 cases, found 100% to have been absorbed. It has been urged that here, again, bacterial decomposition accounts for much of the disappearance of the carbohydrate. Boyd, found, however, that the B. Coli could account for the disappearance of only about 1%. But probably

the lactic-acid-forming organisms would be responsible for more than this. That dextrose is definitely absorbed from the bowel is, however, proved by the following facts. Reach found that the respiratory quotient was raised by rectal feeds of dextrose—a sure sign that they were being utilized by the tissues. The acidosis of delayed chloroform poisoning, or of inanition in esophageal stricture, has been reduced or abolished by this procedure. Now, just as nothing induces acidosis so quickly as deprivation of carbohydrates, so nothing abolishes it so rapidly as their assimilation.

Absorption of Fats.—No emulsion, however fine, is absorbed in the absence of a fat-splitting ferment. This ferment is normally supplied by the pancreatic juice, and in its absence we have to depend upon bacterial decomposition. It is a simple matter to provide the ferment by liquor pancreaticus, but even then absorption may be very imperfect. In one of Edsall's and Miller's cases only 13.61 per cent. of the fat was absorbed. The fat in the yolk of egg is considered to be better absorbed than other forms of fat, but strong reasons have been given above against using eggs in rectal feeding.

Munk and Rosenstein made observations on a patient with a fistula of the thoracic duct. He was first put on a diet very poor in fat, and then enemata of fat and salt were given. In one experiment 3.7 per cent., and in another 5.5 per cent. was absorbed. They thought that the lower the melting point of the fat the better it was absorbed. Deucher concluded that no more than 10 gm. are absorbed daily, and this with difficulty even in favorable cases. Boyd takes a more favorable view. His best result was the absorption of 45 out of 103 gm. administered, and he thinks that fat is useful both directly and as a nitrogen sparer. But he employed the recovery method, which, as stated, is

fallacious. The exceptional opportunities afforded by the case of fistula of the thoracic duct probably gives the most accurate results as to fat absorption by the rectum, and here the amount is very small.

Absorption of Salts and Water.—It is agreed that salts and water are freely absorbed from the large intestine, and the advantages claimed for rectal feeding are probably due to these ingredients. It is well-known that the body can stand deprivation of food for a considerable time if these are supplied. W. Pasteur advocated the administration of 10 oz. enemata of plain water at a temperature of 100° F. every four or six hours. He claimed that the results were at least as good as the ordinary nutrient enemata, while it is far simpler and pleasanter for the patient. Sharkey has used ¾ pint of saline solution 4 times in 24 hours, and has been equally impressed with the advantages of this method.

Langdon Brown has compared the nitrogenous metabolism in patients on rectal salines and nutrient enemata. The nutrient enema which he employed was composed of 4 oz. of milk, 1-2 drachms of plasmon, 1-2 drachms of dextrose, 20 grains of bicarbonate of soda, 1 drachm of liquor pancreaticus, and 5 minims of tinct. opii. The liquor pancreaticus was allowed to act for 20 minutes at 37° C., the opium being added just before administration to increase the tolerance of the bowel. The bicarbonate of soda was added to imitate the normal alkalinity of the pancreatic juice (1 per cent.). This enema was given every 4 hours, the rectum being washed out every night and morning. The total foodstuffs thus given in the 24 hours amounts to:—proteins, 75 grams; carbohydrates, 75 grams; fats, 27 grams. This is clearly much less than the minimum required to keep the body

in nitrogenous equilibrium, even supposing it were all absorbed, which is far from the case, while its caloric value is only 866.

Larger enemata, 1 pint of milk 3 times a day, though recommended by some authorities are difficult in practice, patients usually failing to retain them after the first day or two. This would be equivalent to 66 grams of each of the 3 foodstuffs, and its caloric value would be 1188. The enema administered continuously, drop by drop, is also recommended, but sometimes causes the patient so much discomfort that it has to be abandoned. The enemata should be administered by a soft rubber catheter attached to the barrel of a 4 ounce glass syringe, the contents being allowed to flow in slowly by gravitation.

When no nitrogenous food is taken there is a steady fall of nitrogen in the urine till the output reaches 5 grams a day, or less. One of the first effects of giving nitrogenous food is a rise in the nitrogenous output in the urine, as the greater part of the urea is exogenous, *i. e.*, comes from the food. On the other hand, the purin bodies and the kreatinin remain constant, while the ammonia may rise a little to neutralize the abnormal acids produced. The nitrogenous output in the urine is a more accurate criterion of the absorption of nitrogenous material from the bowel than the loss of nitrogen from the rectal washings, because it is evidence of actual assimilation, and the sources of fallacy mentioned above are excluded.

Langdon Brown found that when only rectal salines are given there is a steady fall of urinary nitrogen. Starting with 10 to 11 grams the first day, it falls to about 5 grams by the 5th day, and usually remains at that point, though in some cases it fell as low as 3, or even 2 grams a day. If the volume of the urine varies considerably from day to day it is necessary to take the average of 3 day periods. Acetone usually appears by the

end of the first 24 hours, and diacetic acid within the next 24 hours. On comparing this result with cases in which the standard enema was used, hardly any difference was detected in the nitrogen output. There was a steady fall in the total nitrogen down to 5 grams, and in one case as low as 4. The onset of acetonuria was, however, delayed as a rule, and it was usually less severe and of shorter duration. The great factor in the production of acetonuria is deprivation of carbohydrate, and as the enema contained both dextrose and lactose the disappearance of acetonuria indicated that some of these were absorbed. One crucial experiment was made. Salines were given till the nitrogen in the urine fell to 5 grams. The standard enemata was then given for two days, but the nitrogen output was hardly affected at all. The same amount of food was then given by the mouth, and the nitrogen output promptly rose.

In other cases the effect of adding 5 per cent. of dextrose to the salines was investigated. We may presume that complete evidence of its assimilation would be afforded by cessation of the acetonuria and a sudden drop in the nitrogen excretion, as the absorbed carbohydrate should spare the nitrogen waste of the tissues and also do away with the necessity of excreting some of the nitrogen as ammonia to neutralize the acidosis. In one such case the average nitrogen output on 3 successive days under rectal salines without dextrose was 11.68 gm., and on the next 3 days, with the addition of 5 per cent. of dextrose to the salines, it was 10.18, so that the result was not very striking. Both acetone and diacetic acid persisted in the urine so that the amount of dextrose absorbed could not have been very large. In another case the addition of 5 per cent. dextrose produced hardly any effect on the curve and acetonuria persisted; then food was given by the mouth. The nitrogen output began to rise again,

diacetic acid promptly disappeared, and acetone vanished a day later.

It should be added that all the cases investigated, except one, were examples of recent hematemesis from gastric or duodenal ulcer. The remaining one was occlusion of the esophagus from corrosive poisoning.

Practical Deductions.—These results go to show that if any protein food is absorbed from nutrient enemata the amount is so little as to make it hardly worth while to subject patients to so much discomfort for so small an advantage. A gain in weight has been claimed as evidence of their value, but this has been observed also on rectal salines. The addition of 5 per cent. of dextrose to the salines is probably an advantage as enough of it may be absorbed at any rate to check acidosis. Even in 5 per cent. solution it is apt to cause pain by the osmotic currents it sets up, and in higher concentrations this is almost certain to occur. Boyd concludes that the average caloric value of the absorbed food in his experiments was 389, *i. e.*, about 1/9 of that on a normal diet, and his criterion of absorption was a rather lenient one. Moreover, in all his cases rectal feeding was well borne, for if it was not, other methods were adopted.

When one begins to doubt the efficacy of rectal feeding its disadvantages assume greater importance. These are (1) the thirst (this should be relieved by giving a rectal saline as well), (2) the difficulty in keeping the patient in a cleanly condition, (3) the secretion of gastric juice which it causes. Umber found in a patient with a gastrostomy wound the injection of food per rectum was followed by the secretion of an acid gastric juice. It does not secure physiological rest to allow this juice to be poured over an ulcerated surface without having any food on which to act. To neutralize this juice the patient should be given bismuth

lozenges to suck. This serves both to neutralize the acid and to form a protective covering to the ulcer. At the same time, by keeping the salivary glands active, it diminishes the chance of (4) parotitis which is due to an ascending infection of the salivary ducts. In this way it is much easier to keep the mouth clean. Incidentally the use of glycerine in a mouth wash for this or, indeed, in any other condition, is objectionable. The desiccation which follows only aggravates the state of the mouth. Plain hot water, to which a little potassium permanganate has been added, is much better. Ice is also objectionable; though pleasant at the time it aggravates thirst. (5) Persistent vomiting is an occasional complication in rectal feeding. If this starts it generally persists until mouth feeding is resumed. Unfortunately it is often regarded as a sign that the stomach cannot tolerate anything, which is not the case. It is probably due to the acidosis consequent on starvation. (6) The pronounced subnutrition induced by rectal feeding is very unfavorable to the healing of an ulcer in patients who are already in a poor physical condition consequent on one or more hemorrhages, and may lead to serious inanition. Auto-digestion goes on more rapidly in fasting than in well-fed tissues, and this may lead to extension of the ulcer and recurrence of the hemorrhage. It it useless to think of building up a patient by this method to a condition of improved nutrition prior to operation, for, say, an impermeable esophageal or pyloric obstruction.

The aim of rectal feeding is to ensure physiological rest. This is an ideal often impossible of realization. The heart must continue to beat, though the valves are studded with vegetations and the pericardium is a bag of pus. The lungs must continue their labors, though many of the alveoli are consolidated and the pleura is coated with lymph. The kidneys must continue to ex-

crete, though their swollen tubules are engorged with blood. And though active ulceration may be proceeding in the stomach the patient must be fed. Rectal feeding is incapable of effecting this, and by favoring self digestion may frustrate the very object in view. In the Lenhartz method of immediate feeding with small and frequently repeated quantities of iced milk and beaten-up-egg we have a safer, simpler and more effective treatment for gastric ulcer, which is free from any disagreeable features. If for any reason this is considered inadvisable rectal salines with 5 per cent. of dextrose may be used for a time. Between these two procedures it is doubtful if there is any place left to-day in therapeutics for the nutrient enema containing protein or fat.

CHAPTER X.

DIET IN DISEASE.

APPENDICITIS.[1]

The dietetic treatment of a case of appendicitis, which has not yet passed into the surgeon's hands, should consist in giving only such foods as will be thoroughly absorbed, leaving as little residue as possible to irritate the lower bowel and excite peristalsis.

Until the outcome of the attack is decided it is best to put the patient upon a fluid diet, consisting chiefly of nutritive broths. Beaten eggs may be allowed, and a moderate quantity of pancreatinised milk, whey, or buttermilk. Cocoa may be given, and strained gruels of rice and barley.

In recurrent cases the patient should be cautioned to eat moderately and avoid all coarse or hard food, such as grits, coarse oatmeal, tough meats, fibrous vegetables, the skin of fruits or potatoes—in short, everything likely to overload the intestine with accumulated waste.

The operative cases should have the diet recommended after laparotomy. Usually the digestive organs require almost absolute rest for twenty-four hours after the operation, and hot water may be sipped. No food at all should be given for fully six hours before operation.

ALBUMINURIA.

Here the diet varies with the nature of the albuminuria. For instance the same diet is not suitable for a patient with tuberculous albuminuria and for one affected with chronic nephritis.

A strict milk diet (2 to 4 quarts) in 24 hours should, however, be immediately prescribed even before the exact cause of the trouble has

[1] W. Gilman Thompson, M. D.: "Practical Dietetics." New York: D. Appleton & Co.

been ascertained. Certain authorities allow eggs, believing that they supply the organism with albumin to replace that eliminated each day by the kidneys. Generally speaking, albuminurics may eat one or two eggs a day.

ALLOWED.—All vegetables (excepting those that contain ingredients contraindicated in the respective cases). It would of course be illogical to permit gouty patients with chronic nephritis to partake of acid vegetables and fruit, white meat: veal, fresh pork, chicken, pigeons, fresh but not oily fish.

Meat permitted once a day at the midday meal, never at night.

Bread, butter and fats.

Drink.—Milk preferably, when the patient can be induced to drink it to the exclusion of all other liquids. Ordinary water, filtered, and alkaline mineral waters (Vichy, Pongues, St. Leger or Alice, Vittel, Vals, Contrexeville, etc.) may be used as a beverage where milk is repugnant.

In certain mild cases of albuminuria new light wine may be allowed.

Alcoholic beverages are forbidden.

PROHIBITED.—All shellfish.

Severe Albuminuria.— In the severe and persistent albuminuria of chronic nephritis, absolute milk diet must be insisted upon for several months. All bread must be prohibited during the first months until the albuminuria has diminished.

The same rule applies if the albuminuria is dependent upon acute nephritis or if it is accompanied by uremic symptoms.

Moderately Severe Albuminuria.—Combine milk diet with vegetable diet, the latter being chosen with regard to the nature of the albuminuria. During periods of remission white meat may be allowed for a time, the urine being closely watched.

Mild Albuminuria.—Combine milk, vegetables and white meats, according to the severity and nature of the albuminuria. Stop the meat and substitute vegetables at the slightest sign of increased albuminuria.

ARTERIOSCLEROSIS.

Since arteriosclerosis manifests itself in a variety of ways it is quite impossible to give any fixed diet as suitable for all cases. If the kidneys are affected the restrictions essential to renal disorders must be followed. If the heart is involved the diet recommended in cardiac affections may be used. If a patient inclines to corpulence and obesity, the rules laid down for this condition should be observed. Each patient should be carefully studied and his diet adjusted to the conditions which present themselves.

Valuable as water is in many phases of arteriosclerosis the patient should be warned never to take an excessive quantity at any one time. Serious harm may be done by thus suddenly raising the blood pressure. The same rule holds good relative to the use of large quantities of any liquid, for the sudden increase of the circulatory fluids that invariably follows often places a severe tax on the expansibility of the arterial coats.

In general the diet suggested by Yeo as advisable for elderly people will be found entirely satisfactory in the dietetic management of arteriosclerosis.

THE PATIENT MAY TAKE.—*Soup.*—Nutritious soups, such as chicken or fish purée, beef tea, mutton or chicken broth. Purées of all kinds.

Fish.—White fish as sole, whiting, smelts, flounders, etc. (best when boiled).

Eggs.—Egg lightly cooked, or beaten up with milk, etc.

Meats.—Young and tender chicken and game. Other tender meats. Potted chicken, game and other potted meats. Sweetbreads, bacon grilled.

Farinaceous.—Bread and butter (bread at least a day old) to be soaked in tea or milk or water. Bread and milk, porridge and oatmeal gruel. Puddings of ground rice, tapioca, arrowroot, sago, macaroni. Prepared foods consisting of predigested starches.

Vegetables.—Potatoes, carrots, spinach and other succulent vegetables, stewed celery, boiled onions.

Desserts.—Fruit jellies, stewed or baked fruit. Pulp of perfectly ripe raw fruit in small quantity, farinaceous puddings.

Liquids.—Milk in all forms, and with the addition of warm Vichy or warm water, fruit juice, etc.

THE PATIENT SHOULD AVOID.—Fried fish, pork, corned beef, veal, heavy bread, hashes, stews, batter cakes, lamb, beef, mutton, gravies, peas, beans, pastry, ice cream, cakes, coffee, tobacco, malt or spirituous liquors.

DIET IN THE BLOOD DISORDERS.

Anemia.—Meats of all kinds are allowed, underdone meats, roasted or boiled, meat juice, raw meat, fresh bone marrow, beef tea, beef soup, green vegetables, particularly watercress and spinach. (*See page 27.*)

All kinds of fruit in plenty.

Rich, highly mineralized wines.

Chlorosis.—Varied and abundant diet. Plenty of milk and eggs, all meats, which should be especially tender, green vegetables, starchy foods, purées, spinach is especially recommended. Fruits.

Rice, Italian pastes, rye bread.

Drink.—White or red wine in moderation, at meals diluted with mineral water.

Coffee or light tea sparingly. Little or no liquors.

No wine between meals, not even Calisaya wine.

It is best to drink warm beverages at meals and use bitter infusions as appetizers.

Hemophilia.—Fresh underdone meats, soups made with bones, shank, oxtail and calves feet, as these contain a large amount of gelatine which increases the consistency of the blood plasma. Fresh bread made from wheat, rye, oatmeal but not corn meal, green vegetables, preferably water cress, salads with vinegar dressing, strengthening beverages in moderation, acid fruits: currants, lemons, oranges, cherries, bilberries.

Rickets.—The diet in rickets should be based upon two factors:

1st. The diminution of the phosphates in the bone tissues.

2nd. The existence of gastrointestinal autointoxication which usually causes a lack of phosphates.

For breast babies all the necessary constituents are found in the mother's milk. When nursing is not feasible the child should be fed regularly with raw or boiled milk from the bottle.

If the child has been weaned, add to the milk cornmeal and oatmeal gruel which contain phosphates and fats. Administer yolk of egg, lecithin, glycerophosphates, purées of beans and lentils.

CARDIAC DISEASES.

In heart affections it is important to consider not only the anatomical character of the lesion but also the degree of functional activity of the organ. If the cardiac lesion is accompanied by compensatory changes there is no need of altering the patient's mode of living. He should eat as if he were in good health, but should partake sparingly of green vegetables and should drink but little water at a time. When there are no compensatory changes and gastric disturbance is present a diet to counteract this latter should be ordered. While the cardiac insufficiency is present red meats should be prohibited and only occasionally a small amount of white meat should be allowed. If dyspnea becomes very severe a strict milk diet must be ordered. Huchard has shown that there exists in patients with heart disease a dyspnea due to ptomainemia caused by gastrointestinal ptomaine poisoning.

CONVALESCENCE.

According to Thompson,[1] convalescents who have long subsisted solely upon fluids must be careful in resuming solid diet, for the rapidity of recuperation of the digestive organs varies in different persons, and taking meats or other solid foods too soon may cause rise in temperature, rapid heart action, and possibly visceral congestion. The first meat given, therefore, should be in a finely subdivided state, such as scraped beef or minced chicken.

[1] W. Gilman Thompson, M. D.: "Practical Dietetics." New York: D. Appleton & Co.

During convalescence from protracted fevers the more easily digested forms of starchy foods are found to be very useful, especially if there has been much loss of weight. Sago and tapioca, and dried bread crumbs rolled through a fine sieve may be added to thicken clear meat broths. Crackers and zwieback are useful.

Other ingredients which may be added to thicken soups during convalescence are panada, semolina, tapioca, and macaroni. Custard puddings, cooked fruit, wine and beef jellies, blanc-mange, or baked custard, may be allowed. "Mush," fine hominy, cornstarch, farina, and boiled rice, with beef juice, can be ordered.

The following dietary will serve as a general guide for feeding convalescents from fevers of ordinary severity in which special lesions of the alimentary canal are not present.

FIRST DAY.

Breakfast.—Poached egg on toast. Cocoa.
Lunch.—Milk punch.
Dinner.—Raw oysters. Cream crackers. Light wine if desired.
Lunch.—One cup of hot meat broth.
Supper.—Milk toast. Wine jelly. Tea.

SECOND DAY.

Breakfast.—Soft cooked egg. Milk punch. Coffee with sugar and cream.
Lunch.—One cup of soft custard.
Dinner.—Cream of celery soup. Sippets of toast. A little barley pudding, with cream. Sherry wine if desired.
Lunch.—Milk punch.
Supper.—Water toast, buttered. Wine jelly. Tea.

THIRD DAY.

Breakfast.—Coddled eggs. Cream toast. Cocoa.
Lunch.—One cup of hot chicken broth.
Dinner.—Chicken panada. Bread Light wine if desired. A little tapioca cream.
Lunch.—An eggnog.
Supper.—Buttered dry toast. Baked sweet apples and cream. Tea.

FOURTH DAY.

Breakfast.—An orange. Oatmeal (H. O.), with cream and sugar. Poached egg on toast. Baked potato. Cocoa.

Lunch.—One cup of hot, soft custard.

Dinner.—Potato soup. Croûtons. A small piece of beefsteak. Creamed potatoes. Baked custard. Coffee.

Lunch.—One cup of chicken broth, with rice.

Supper.—Raw oysters. Banquet crackers. Graham bread, toasted. Wine jelly. Tea.

FIFTH DAY.

Breakfast.—An orange. Coffee. Oatmeal, with cream and sugar. Broiled mutton chop. Toast.

Lunch.—One cup of mulled wine.

Dinner.—Chicken soup. Bread. Creamed sweetbreads. Duchess potatoes. Snow pudding. Cocoa.

Lunch.—Siphon soda, with coffee syrup and cream.

Supper.—Buttered dry toast. Orange jelly. Sponge cake and cream. Tea.

For convalescence, if the patient's purse can afford it, champagne, port wine, sherry, Madeira, or a good claret or Burgundy, may be taken with advantage, in the class of cases above mentioned.

CONSTIPATION.

Water is unquestionably one of the most valuable measures for promoting bowel activity and regularity and the habit of drinking one, two or even three glasses, the first thing on arising will often insure a satisfactory evacuation daily. Other personal habits, as Pattee points out, often contribute to bowel regularity, as for instance, in men smoking a cigar after breakfast. Women especially find the morning draught of cold water valuable. The use of fruit at or before breakfast often causes an evacuation during the day. This is true especially of apples, pears, oranges, etc. Buttermilk is also largely used for this purpose. The vegetable acids with the large amount of indigestible residue make certain fruits valuable as laxatives. This is true also

of berries, although those which contain tannin (blackberries) may tend to constipate. Dried fruits, such as figs and prunes are especially useful. The use of sweet cider as a marked laxative seems to illustrate again the laxative power of vegetable acids. Very sweet substances in large amounts, chiefly honey and molasses are notably laxative. Oatmeal, among the cereal foods, is noted for its laxative powers. Beans and peas, popularly believed to be laxative, are really constipating; but the fermentation of the large amount of cellulose gives the illusion of impending diarrhea. Oils and fats are laxative to many people. A word of caution must here be inserted. Many of these substances carelessly spoken of as laxatives, often behave as violent purgatives, especially in individuals who alternate between constipation and diarrhea. The severe diarrhea set up at times by sweet cider, molasses and other relatively inert substances should teach us caution in giving such articles to patients.

No more important hygienic regimen can be adopted than the following: 1. Eat fruit before retiring (experiment and find what fruit seems to agree best). 2. Three-quarters of an hour before breakfast drink two glasses of cold water and exercise ten minutes in room before open window or take a brisk walk. If this regimen were followed daily by children and grown people there would be less illness.

ALLOWED.—*Soup.*—Oyster soup, meat broths, bouillon.

Fish.—Raw oysters, fresh fish of all kinds, broiled or boiled.

Meats.—Game, poultry, almost any fresh meats.

Farinaceous.—Rye bread, brown bread, graham, corn and whole wheat bread, hominy, mush, cereals, Educator Bran Cookies.

Vegetables.—Salads with oil, string beans, green peas, green corn, asparagus, potatoes, cauliflower, spinach, brussels sprouts, onions, boiled.

Desserts.—Simple and light-apple and fig puddings, plain pudding, as custards, whips, and gelatin, etc., junkets, ice cream, sherbet, ices, hominy, raisins, cherries, huckleberries (the blue seedless kind), grapes, melons, apples, oranges, pears, ripe peaches, baked apples, with cream, figs, stewed prunes.

Liquid.—Unfermented grape juice, plenty of pure water, cold or hot; black coffee, cocoa, new cider, buttermilk, orange juice, malted milk. The laxative waters are often exceedingly useful, the best of which are Carabana, Condal, St. Leger, etc.

AVOID.—Spirituous liquors, pineapple, cheese, nuts, tea, sweets, milk, pastry, rich puddings, rice, tapioca, new bread, eggs, liver, pork, salt, smoked, potted or preserved fish or meats.

In connection with the dietetic management of constipation attention should be directed to Schmidt's studies relative to the addition of some nondigestible but water carrying substance to the daily food. He recommends agar-agar, which is best employed in the form of Regulin, the preparation evolved by Schmidt. Lack of space prevents any extended discussion of this new theory but it seems very plausible and the results obtained have been extremely gratifying.

DIARRHEA.

The diet employed in the management of diarrhea at the Massachusetts General Hospital is as follows:

THE PATIENT MAY TAKE.—Stale bread, dry toast, crackers, butter, rice, soft cooked egs, eggs and milk, flour and milk puddings, boiled and peptonised milk, tea, custards, blanc-mange, wine jelly, oatmeal, oysters, gruel, chicken.

THE PATIENT SHOULD AVOID.—Soup, animal broths, fresh bread, fruits, vegetables, fried dishes, fish, saccharine foods, salt meats, veal, lamb and pork.

DYSENTERY.

According to Thompson, during an attack of acute dysentery the patient should be kept absolutely quiet in bed, and should not be allowed to rise for the movement of the bowels, making use of a bed-pan instead. Throughout the active stage the diet must be strictly confined to easily digestible food, and in most cases it is wisest to give only predigested fluid articles. Peptonised or pancreatinized milk, or boiled milk, pressed-meat juice, whey, or raw egg albumin beaten with sherry and flavored with nutmeg are recommended. Many patients do best upon a diet of raw scraped beef or meat balls.

In cases of acute dysentery, and especially in the amebic form, the loss of strength, anemia, and emaciation progress very rapidly, and the strength must be supported by stimulation, for which brandy is preferable to whiskey.

During convalescence the diet must be very cautiously increased, and confined to food which is promptly and completely digested, leaving but little residue. For this purpose animal food should be chiefly eaten, while fish, tender beefsteak, roast beef, boiled or broiled chicken, eggs, custard, blanc-mange, dry toast, junket, well-boiled rice, or wine jelly, may be given. All fruits and vegetables must be forbidden, and butter and cream should be taken sparingly.

If the disease occurs in infancy, the child, if possible, should be fed at the breast. Otherwise all milk and water given should be pasteurized. Beef tea and mutton broth may be allowed in moderation, and special care should be observed not to overfeed.

DIABETES.

In an unusually strong paper on the Treatment of Diabetes,[1] Heinrich Stern points out that three different opinions prevail today as to the energy requirement of the diabetic. Some contend, he continues, that the caloric value of his food should not essentially differ from that of a healthy individual; others, and these are still in the majority, assert that there will ensue a metabolic deficit if sufficient extra calories are not added to his ration; and others again maintain that the nutrition of the diabetic should be kept at a comparatively low level. Each one of these rules is right and wrong at the same time. Adherence to one may benefit one patient and infinitely harm another. Iron-clad rules have no place in the management of the diabetic state. Diabetics affected with a mild type of the disease and above fifty years of age, for instance, will often get along very nicely on a diet of a caloric value similar to that of the normal individual of the same age and doing the same kind and amount of work; in other cases of diabetes, especially in the pre-acetonemic forms of childhood and adolescence, the energy requirement of the body may demand a somewhat larger amount

[1] *New York Medical Journal.*

of fuel, and in many cases of diabetes of the obese and in instances of far-advanced diabetes a low diet seems to be often imperative.

"Once for all, it must be understood that a diabetic regimen of rather scant caloric value (25 to 30 calories per day and kilogram of body-weight) is better adapted to enhance the tolerance for both carbohydrates and proteids than is the ordinary, time-honored, highly calorific antidiabetic dietary. Furthermore, it should be remembered that the method of determining the fuel value of the ingesta has absolutely nothing to do with food assimilability and catabolisity in the diseased organism. We must always reckon with the inability of the diabetic organism to utilize rationally many foodstuffs; however, we must not lose sight of the fact that nutriments a diabetic frequently profits by if supplied in limited amounts may not be entirely assimilated or will often give rise to more or less serious disturbances when ingested in larger quantities as a substitute for ordinarily not well-tolerated foodstuffs. Hence the more recent thought to rather keep down the total nutrition and reduce the intake of all types of food in certain forms and stages of diabetes than to risk the production of untoward phenomena—possible precursors of a fatal issue."

If there is any one disease that exemplifies the statement made elsewhere that a patient's reaction to food can only be determined many times by the most painstaking and systematic dietetic tests and trials, it is diabetes.

Feeding the diabetic patient, therefore, is invariably a tentative matter to ascertain not only his tolerance to carbohydrates but equally to ascertain how small amounts of the starches and sugars he can take without lowering his nutrition or producing harm. Experience has shown that sudden and complete withdrawal of the carbohydrates often precipitates acidosis and coma. Willcox in his recent work on "The Treatment of Disease"[1] calls especial attention to this and says:

"An exclusive diet of proteids and fats is not advisable unless absolutely necessary, for it has been proven that coma is more likely to occur in patients who are getting absolutely no carbohydrate food. When carbohydrate food is allowed a diabetic we must see to it that the organism is able to take care of it and does not excrete it as glucose. In this connnection regulation of the amount of carbohydrate

[1]R. W. Willcox, M. D. "The Treatment of Disease."

intake and proper exercise will do much. For instance, in an obese diabetic of the alimentary type who is accustomed to little exercise, we may at first eliminate most of the carbohydrate foods until the glycosuria has disappeared and then gradually allow a return to a mixed diet, slowly increasing the patient's physical exercise the while so that he may be able thus to convert the steadily augmenting intake of starchy food. A pedometer is an excellent instrument for determining the amount of walking which a patient can and should do. Thin patients of this type we can hardly deprive of carbohydrates, since they need a certain amount of this class of food to keep up their nutrition, otherwise this deteriorates and the diet consisting of fats and proteids alone is almost certain to engender a cirrhosis of the liver. Consequently, the thin alimentary diabetic may be allowed starchy foods in certain quantity and we should be content if we reduce the quantity of sugar in his urine to one-half of one per cent."

Willcox[1] continues, with regard to the articles of diet which diabetics may be allowed it may be said that such foodstuffs should be selected as contain no carbohydrate whatever; or very little carbohydrate or carbohydrate in easily assimilable form which may be converted by the organism. To the first class belong all varieties of fresh and salt meat, liver excepted, clear meat soups, poultry, fish, shellfish, butter and eggs, fats and oils, and cheese.

As belonging to the second class may be mentioned the green vegetables, such as cabbage, cauliflower, brussels sprouts, string beans, onions, cucumbers, tomatoes, lettuce, escarole, romaine, chicory, watercress, spinach, dandelion, beet tops, asparagus, all nuts except chestnuts, all the acid fruits, and jellies, (unsweetened) prepared from meat juices and gelatin.

Many of these substances contain a considerable quantity of sugar but not in the form of grape sugar. The various sugars and starches which they contain are more easily converted than glucose and consequently are taken care of by the organism. Fortunately, milk sugar is of this class and milk may be freely given to diabetics. Other sugars, which are likely to prove more rapidly convertible than glucose are levulose, the sugar of fruit, and inosite, the sugar of muscle.

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[1]R. W. Willcox, M. D. "The Treatment of Disease."

With regard to bread it may be said that the toast of wheat bread twenty-four hours old is preferable to gluten or graham breads. Gluten flour may, however, be used to make bread or biscuits for diabetics, but it is necessary to obtain a pure gluten, which is impossible in the United States. Many of the so-called "health foods" which are widely advertised as positive cures for diabetes are deliberate frauds. Cakes and biscuits made of flour of the soya bean are admissible and are said to be palatable. When stale they are likely to be rancid since the flour contains an oil. Bread made from almonds or from aleuronat flour is highly recommended.

Butter may be eaten by diabetic patients but it is best to limit its quantity.

REGULAR DIABETIC DIET.

Following is an excellent regimen for the ordinary case:

PATIENT MAY BE ALLOWED.—*Soups.*—Soups or broths of beef, chicken, mutton, veal, oysters, clams, terrapin or turtle (not thickened with any farinaceous substances), beef tea.

Fish.—Shellfish and all kinds of fish, fresh, salted, dried, pickled or otherwise preserved (no dressing containing flour).

Eggs.—In any way most acceptable.

Meats.—Fat beef, mutton, ham or bacon, poultry, sweetbreads, calf's head, sausage, kidneys, pig's feet, tongue, tripe, game (all cooked free of flour, potatoes, bread or crackers).

Farinaceous.—Gluten porridge, gluten bread, gluten gems, gluten biscuits, gluten wafers, gluten griddle cakes, almond bread or cakes, bran bread or cakes.

Vegetables.—String beans, spinach, beet tops, chicory, kale, letture plain or dressed with oil and vinegar, cucumbers, onions, tomatoes, mushrooms, asparagus, oyster plant, celery, dandelions, cresses, radishes, pickles, olives.

Desserts.—Custards, jellies, creams (without sugar), walnuts, almonds, filberts, Brazil nuts, cocoanuts, pecans.

Drinks.—Tea or coffee (without sugar), pure water, peptonised milk.

PATIENT SHOULD AVOID.—Liver, sugars, sweets or starches of any kind, wheaten bread or biscuits, corn bread, oatmeal, barley, rice,

rye bread, arrowroot, sago, macaroni, tapioca, vermicelli, potatoes, parsnips, beets, turnips, peas, carrots, melons, fruits, puddings, pastry, pies, ices, honey, jams, sweet or sparkling wines, cordials, cider, porter, lager, chestnuts, peanuts.

BELLEVUE HOSPITAL DIABETIC DIET.

Meat.—Fat beef, mutton, ham and bacon.

Fish.—Fresh fish, salted codfish, canned salmon, sardines, oysters and clams.

Farinaceous.—Gluten bread and biscuits.

Vegetables.—String beans, spinach, lettuce with olive oil and vinegar, cabbage, cucumbers, onions, tomatoes, cauliflower, asparagus, celery, watercress, radishes, pickles and olives. Cream cheese.

Dessert.—Custards, jellies and creams (without sugar), walnuts, Brazil nuts and pecans.

Drinks.—Tea or coffee without sugar, water and buttermilk.

Special Diabetic Foods.—Among the special diabetic foods, the Casoid Foods are probably best known, and in a recent article, Tyson refers to them and states that he has had good results from their use. These foods come in the form of a flour, three varieties of biscuits or crackers, and rolls.

ECZEMA AND ECZEMATOUS AFFECTIONS.

As Pattee[1] sententiously says, practically all skin diseases improve under dietetic measures and often recover under these alone. While no special plan applies to all, the elimination of sugar and sweets of all kinds, and substances rich in fat, as cheese, nuts, fried articles, etc., is essential. Pure fats like butter, cream, salad oil, etc., are, however, well enough in small amounts. Malt liquors and sweet wines disagree, largely because of the sugar therein; but alcohol itself is also prejudicial in many cases.

It is well to take all food in small rations, and masticate it thoroughly; for the prejudicial effect of food in skin diseases is often directly attributable to fermentation, favored by atony of the digestive

[1]A. D. Pattee, "Practical Dietetics."

tract, dilated stomach, constipation, etc. Physical exercise is of great benefit in most of these cases.

The diet and other regimen in skin diseases is much like that for obesity, gout and diabetes. All these metabolic disorders tend to produce skin diseases.

We all know, furthermore, the intimate relation of the intestines and the skin, or to be more exact, the cutaneous manifestations of gastrointestinal disorders causing a slight degree of autointoxication.

As a consequence, in the dietary of skin affections all foods that tend to produce intestinal toxemia should be prohibited, for example, game and pickled or soused meats, all canned fish or fowl, duck, goose, beef juice, meat powder, fish, unless very fresh, shellfish, fats, strong cheese, highly seasoned gravies, condiments. Certain vegetables should also be prohibited: onions, cabbage, tomatoes, sorrel, watercress, scallion, eggplant, truffles, mushrooms, garlic. *The following are allowed:* milk and eggs extensively, toast, stale bread.

Beverage.—White and red wine diluted with water, coffee and light tea. Vittel, Vichy, Celestine, etc. Mixed with a little white wine or light red wine, Bordeaux or Moselle, milk and light chocolate. Do not drink: Liqueurs, champagne, strong wines, coffees, tea, beer or cider.

DIET IN THE MANAGEMENT OF FEVERS.

Our aim in the dietetic treatment of fevers is to withdraw all articles of food likely to conflict with the existing condition, and to maintain nutrition with a minimum amount of work for the various functions of the body.

Water being so easily assimilated, fluid diet necessarily plays an important part in the management of febrile cases.

Milk holds the first place among the foods suitable for these cases. Next in importance come the meat preparations: (Juice, extract, powder and broths), clear soups (consommés), purées or thickened

soups (arrowroot, rice, flour, semolina, tapioca, sago, Italian pastes). Fruit. Soups.

Semi-solid foods may be given in moderately severe cases, when there is no digestive disturbance and in convalescence. They include milk or cream toast, beef jelly, plain rice pudding, oatmeal, rice and barley gruels, well strained, soft boiled eggs, eggs broken into hot consommé, raw eggs, plain or beaten up with brandy or sherry. Cold meat, chicken or lemon jelly combined with beef tea, custard pudding, blanc-mange, and cooked fruits.

Water, either plain or in some form of beverage is indicated in fever. Sour lemonade is refreshing and beneficial, so are barley, rice and albumin water. Coffee and tea should be employed with discretion. Whey, whey and beef tea, hot or cold, unfermented grape juice are of value.

Cracked ice is sometimes useful for allaying the thirst and checking nausea; in excess, however, it is apt to disturb digestion.

Smallpox.— *During the suppurative stage* give abundant nutritious and digestible food: milk, eggs, whiskey (eggnog, milk punch), meat broth.

During convalescence.—Gradually extend the diet to milk, eggs and meat. Ale, porter and Burgundy may be taken for stimulation.

Scarlet Fever.—*During the fever,* fluid diet is indicated: milk, Koumiss, soups, broth, gruel (arrowroot, farina, etc.). The best results are obtained with an exclusive milk diet, owing to the possibility of renal complications.

In convalescence.—Junket, rice pudding, crackers, farina, cornstarch, sago with cream, milk or cream toast, baked custard, blanc-mange, wine and beef jelly, baked apples, stewed prunes, orange juice.

Meat should be resumed gradually beginning with eggs, fish, oysters and chicken.

Influenza.—Exclusive milk diet is needed at first in severe cases. Later, beef, mutton, or chicken broth with egg beaten in it, milk toast, custard, eggnog, milk punch, may be given. When solid food is permissible, give beef sandwiches, oysters, breast of chicken, poached or scrambled eggs, light farinaceous foods.

In convalescence.—Which is often protracted, only easily digested foods should be prescribed. Milk when tolerated, eggs, chicken, beefsteak, roast beef.

Alcohol, milk punch, whiskey and soda, Burgundy or malt liquors when stimulation is needed.

Diphtheria.—Fluid diet: milk alone or thickened with cream, gelatine, eggs or farinaceous foods. Malted milk or meat powder. Beef or chicken broth. Egg albumin, eggnog, milk, milk punch. Vanilla ice cream is often acceptable to the patient. Arrowroot, rice, cream toast, gruel. Alcohol is usually required.

Erysipelas.— *In high fever*, nausea and vomiting feed cautiously. Ordinarily give pancreatized milk, beef peptone, beef juice, eggnog, milk punch, gruels. Alcohol is usually a necessity.

In convalescence.—Gradually replace fluid diet by bread and butter, toast, soft boiled eggs and beef.

Typhoid Fever.—It is important, says Latham,[1] that the diet in typhoid fever should not cause distension or leave much undigested residue. In all cases of typhoid fever the tension of the abdomen should be closely examined daily. If there be any tendency to distension the diet must be modified, or, if necessary, only whey or albumin water given. Further, the stools should be inspected daily, and if any undigested residue is present the diet must be modified.

As a rule, the best diet during the febrile stage is 2 to 3 pints of milk in twenty-four hours, the milk being diluted in the proportion of 3 parts to 1 part of water. Fifteen gr. of sodium citrate should be added to each 10 oz. of milk. The milk may be flavored with tea, coffee, cocoa, chocolate, or allowed to stand on bread, etc., and then strained. Successive flavoring agents should be used if the patient's taste becomes irritable. Eggs should be avoided as being apt to set up diarrhea. Custard, junket and milk, chicken or calf's foot jellies are useful variations. If milk is undigested or gives rise to distension, it should be peptonised; if this procedure fails, whey or albumin water may wholly or in part replace the milk. Patients do well on a purely whey diet for two to three weeks. Water may be allowed freely, provided

[1] "Medical Treatment," by Arthur Latham, M. D., published by P. Blakiston Son & Co.

that not more than 1 oz. is taken at a time. A little lemon juice should be added to the water. Ice in any quantity tends to produce flatulence.

Beef tea, meat soups, and gravy are inadvisable, as they increase the tendency to flatulence.

When the temperature has been normal for a week or ten days, bread and milk may be permitted, then bread and butter, rice pudding, pounded fish, then boiled fish, minced meat, etc., in succession. The nurse must see that the patient thoroughly masticates any solid food given him. It sometimes happens that the temperature persists for five or six weeks although all other symptoms have gone; in such cases the temperature is often due to exhaustion, and quickly drops on a judicious use of raw beef juice and a more solid diet, as in established convalescence. In some cases, a patient may be permitted to have solid food at an earlier period. Such cases should be carefully selected; the patient must be in full possession of his senses, and must be warned of the danger of swallowing solid portions. He must chew the food thoroughly, and the undissolved portions (such as the fibre of meat) must not be swallowed, but spat out.

DIET IN TYPHOID AFTER TWO DAYS OF NORMAL TEMPERATURE.[1]

First Day.—Chicken broth thickened with thoroughly boiled rice. Milk toast or cream toast once only during the day. Beef juice.

Second Day.—Junket, mutton broth, and bread crumbs. Cocoa. Milk toast. A piece of tender steak may be chewed but not swallowed. One of the prepared farinaceous foods, such as Horlick's, may be given with a cup of hot milk.

Third Day.—A small scraped beef sandwich at noon. A soft cooked egg or baked custard for supper. Boiled rice or potato purée strained. Arrowroot gruel.

Fourth Day.—The soft part of three or four oysters. Meat broth thickened with a beaten egg. Cream toast. Rice pudding or blanc-mange and whipped cream, or Bavarian cream.

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[1] W. Gilman Thompson, M. D.: "Practical Dietetics." New York. D. Appleton & Co.

Fifth Day.—Scraped beef sandwich. A tender sweetbread. Bread and milk. A poached egg. Wine jelly or calf's foot jelly. Macaroni.

Sixth Day.—Mush or crackers and milk, scrambled eggs, chicken jelly. Bread and butter. The soft parts of raw oysters.

Seventh Day.—A small piece of tenderloin steak or a little breast of broiled chicken. Bread and butter. Boiled rice. Wine jelly. Sponge cake and whipped cream.

Eighth Day.—A slice of tender rare roast beef, a thoroughly baked mealy potato served with butter or mashed with cream. Other food as before.

Ninth Day.—A little broiled fresh fish for breakfast. Beefsteak at dinner. Rice, macaroni, eggs. Sago, rice, or milk pudding. A baked apple.

Tenth Day.—Mush and milk. A squab or breast of partridge or roast chicken. Other foods as before. Ice cream.

GENITO-URINARY AFFECTIONS.

Gravel.—There are three kinds of gravel: uric acid gravel, oxalic acid gravel and alkaline gravel. For each of these forms there is a special diet.

Uric Acid Gravel.—ALLOWED: Little or no meat, plenty of vegetables, only lean white meats are permissible. In some cases, green vegetables and fruit in plenty, bread ad libitum.

FORBIDDEN.—Dark meats, game, especially when it is high, oily fish, shellfish, truffles, mushrooms, rich and highly spiced gravies, rich and fatty food in general.

Drink.—Mineral waters of Weisbaden, Carlsbad, Aix-les-Bains, Brides-les-Bains, Santenay, Bagueres de Bigorre, Bussang.

Light beer, cider or Bordeaux wine largely diluted with water may be allowed sparingly. Light tea, coffee, liqueurs, alcohol are prohibited.

Oxalic Acid Gravel.—PROHIBITED: All food containing oxalic acid, sorrel, spinach, apples, peaches, currants, cherries, strawberries, beans, figs, pepper cacas, chocolate.

No wine, cider, alcohol, liquors or old acid beer.

ALLOWED.—All meats, excepting when there are vesico-renal complications, white meats are always preferable. Bread should be made from flour entirely free from bran.

Drink light beer and the mineral waters.

Alkaline Gravel.—This is often a sequela of the foregoing forms, and requires a diet in accordance wtih the causation. In addition as a special diet for this form of gravel all distinctively alkaline foods, vegetables or alkaline mineral waters should be eliminated.

Milk and slightly mineralized waters (Vittel, Evian, Contrexeville) may be allowed.

GOUT.

For old or feeble persons the diet, says Pattee, although restricted must be more supporting than is needed for younger patients; have broths, etc., stronger, and beef juice, chicken broth and an egg beaten up in a glass of milk once a day. Alcohol may also be necessary.

In protracted cases it may be necessary to allow more nutritious diet, including fish, soup and white meats, as well as an allowance of brandy or whiskey. Following is the general accepted diet in gout:

PATIENT MAY TAKE.—*Soups.*—Clear vegetable broths, fresh fish soup.

Fish.—Fresh fish broiled or boiled, raw oysters.

Meats.—Eat of all kinds sparingly, game, chicken, fat bacon.

Farinaceous.—Crackers, dry toast, milk toast, macaroni, graham bread or rolls, rye bread, whole wheat bread, or biscuit, cereals.

Vegetables.—Celery, lettuce, cresses, cucumbers, cabbage, spinach, string beans, green peas, mashed potatoes.

Desserts.—(All without sugar). Plain milk puddings, junket, rice and milk. Stewed fruits.

Liquids.—Pure water, hot or cold, toast water, buttermilk, milk, malted milk, weak tea (no sugar).

PATIENT SHOULD AVOID.—Champagne, sweet wines, malt liquors, cider, coffee, tobacco, dried fruits, nuts, cheese, sweets, pastry,

pies, spices, rich puddings, fried dishes, vinegar, pickles, lemons, rhubarb, mushrooms, asparagus, sweet potatoes, tomatoes, gravies, patties, rich soup, eggs, lobster, salmon, crabs, mackerel, eel, veal, pork, goose, duck, turkey; salted, dried, potted or preserved fish or meat (except fat bacon).

INDIGESTION.

Indigestion is essentially a very broad and indefinite term, but there is a group of more or less chronic affections of the gastrointestinal tract that the broad term indigestion can be applied to. While these affections vary widely the dietetic considerations are identical and the following is a regimen that will be found serviceable:

THE PATIENT MAY TAKE.—*Soups.*—Clear thin soups of beef, mutton or oysters.

Fish.—Oysters raw, shad, cod, perch, bass, fresh mackerel.

Meats.—Beef, mutton, chicken, lamb, tripe, tongue, calf's head, broiled chopped meat, sweetbread, game, tender steak.

Eggs.—Boiled, poached, raw.

Farinaceous.—Cracked wheat, hominy, rolled oats, rice, sago, tapioca, crackers, dry toast, stale bread, corn bread, whole wheat bread, graham bread, rice cakes.

Vegetables.—Spinach, sweet corn, string beans, green peas, lettuce, cresses, celery, chicory, asparagus.

Desserts.—Rice, tapioca or farina pudding, junket, custards, baked apples, apple snow, apple tapioca, ripe fruits—raw or stewed.

Drinks.—*One* cup of weak tea, coffee, cocoa, milk and hot water equal parts, or *one* glass of pure cool water, sipped after eating.

PATIENT SHOULD AVOID.—Rich soups or chowders, veal, pork, hashes, stews, turkey, potatoes, gravies, fried foods, liver, kidney; pickled, potted, corned or cured meats; salted, smoked or preserved fish; goose, duck, sausage, crabs, lobster, salmon, pies, pastry, candies, ice cream, cheese, nuts, ice water, malt or spirituous liquors.

HEPATIC DISORDERS (BILIOUSNESS).

The patient suffering from functional affections of the liver or biliary ducts may take the following:—

Soups.—Vegetable soups with a little bread or crackers, light broths.

Fish.—Boiled fresh cod, bass, sole or whiting, raw oysters.

Meats.—Tender lean mutton, lamb, chicken, game (all sparingly).

Farinaceous.—Oatmeal, hominy, tapioca, sago, arrowroot (well cooked), whole wheat bread, graham bread, dry toast, crackers.

Vegetables.—Mashed potato, almost all fresh vegetables (well boiled), plain salad of lettuce, water-cress, dandelions.

Desserts.—Plain milk pudding of tapioca, sago, arrowroot or stewed fresh fruit (all without sugar or cream), raw ripe fruits.

Drinks.—Weak tea or coffee (without sugar or cream), hot water, pure, plain or aerated water.

For reasons that will be apparent they should not take:—Strong soups, rich made dishes of any kind, hot bread or biscuits, preserved fish or meats, curries, red meats, eggs, fats, butter, sugar, herrings, eels, salmon, mackerel, sweets, creams, cheese, dried fruits, nuts, pies, pastry, cakes, malt liquors, sweet wines, champagne.

OBESITY.

In the treatment of obesity we must study thoroughly the habits and the mode of life of the patient. In some that do not exercise enough the addition of more bodily exercise will accomplish our aim.

In others a slight regulation of the diet, the taking off of an extra sandwich, an extra glass of beer or wine will correct the evil. In the majority of cases the correction of both will be required. We must diminish the intake of calories as much as possible and at the same time raise the expenditure of energy.

One of our greatest helps in the treatment of obesity, says a writer in the *New York Med. Journal*, is the fact that each of the three classes of foodstuffs, the proteins, carbohydrates and fats, can be substituted for one another, provided they contain an equivalent number of calories.

Thus ten grams of butter (one cubic inch) is equivalent in the system to ninety grams of potatoes, both representing about eighty calories.

There are, however, certain limitations to this postulate, namely, that there must always be a certain amount of proteins and carbohydrates introduced, else in the reduction the body albumin, the muscles, blood, viscera, etc., will suffer, while normally in a reduction cure the fat only is being sacrificed and not the body albumin.

Working on these principles, we exclude from the diet for obesity all visible fat, for fats represent the highest caloric values, one gram of fat representing 9.3 calories; while one gram of carbohydrate or one gram of protein contains only 4.1 calories each. We therefore exclude all visible fat such as fatty meat, fatty fish, oil, butter, sweet cream, etc.

We allow articles that represent the lowest caloric values in the largest bulk. Such articles are potatoes, lean meat, lean fish, lean cheese, eggs, bran bread, graham bread in moderation, oysters, all kinds of vegetables (prepared without oil), all kinds of fruits, soups with fat strained off, skimmed milk, buttermilk, tea, coffee, vinegar, lemon, mineral waters. Of these articles a fairly liberal diet may be selected.

The following articles must be avoided or taken only sparingly, as they containn a high caloric value: All fatty and greasy foods, sugar, white bread, crackers, biscuits, all kinds of sweets, syrups, dried peas and beans, dried fruits, cereals, grape nuts, liquors, beer, malt. The patient when put on a reduction diet must adhere to it else the resulting loss of flesh will soon be regained.

The second factor is the raising of the expenditure of the energy of the body. This is best accomplished by mountain climbing. Unfortunately it is not accessible to every one. Manual work, various gymnastic exercises, running, rowing, swimming, golf and tennis playing, bicycle riding, work about the house, gardening, deep breathing, are all reliable means of increasing the output of energy. During exercise it is proper to watch the heart action lest damage be done.

Cold baths and douches are very good. By applying the cold water the surface of the body gets chilled, and to warm it up some body fat must be burned up.

Hot baths and sweating are not good. The loss of flesh that is secured by them is merely due to a loss of water and not fat, which is soon replenished by the intake of water. Fat cannot be sweated off. It must be worked off or starved off. Massage reduces the masseur, but not the person massaged.

A patient may be of marked obesity that has persisted for years, with a family tendency, when more exact means at reduction must be applied. We must prescribe a diet based on exact caloric calculations or, which is preferable, to do it in an institution where the patient can be under constant surveillance. The following is the method to pursue in caloric calculations. A patient weighing about 100 kilograms presents himself for reduction. We must determine first how much would be the proper weight for the size of that person.

Let us assume that seventy-five kilograms would be the proper weight for that patient. We next determine how many calories would constitute the maintenance diet of such a person. Obese people as a rule are not very active and forty calories for each kilogram would be the proper amount. The maintenance diet therefore would be 40x75 equal 3,000 calories.

We take the actual amount of protoplasmic tissue and omit the fat from our calculations, for it is the protoplasmic tissue that is chiefly concerned in oxidation processes. By taking off the patient's diet about 800 calories each day, a loss of about one kilogram a week will be achieved. We must therefore arrange diet lists equivalent to 2,200 calories a day. These diet lists are compiled by the help of tables giving the relative caloric values of different articles of food.

As Pattee states, the selection of food varies but little from the diabetic regimen.

FOLLOWING IS A LIST OF FOODS THAT MAY BE TAKEN:

Fish.—All fresh white fish broiled or boiled.

Meats.—Lean mutton or lamb, beef, chicken, game (sparingly).

Eggs.—Cooked in all ways (not fried).

Farinaceous.—Dry toast or crusts, stale bread (sparingly).

Vegetables.—Lettuce, celery, spinach, cresses, asparagus, cauliflowers, white cabbage, onions, tomatoes, radishes, olives.

Liquids.—Coffee or tea, one cup without milk, cream or sugar; pure water one glass, drank slowly *after the meal.*

THE PATIENT SHOULD AVOID.—Dark flesh fish, rich soups, salt fish, veal, pork, sausage, fats, potatoes, oatmeal, hominy, macaroni, spices, rice, carrots, beets, turnips, parsnips, puddings, pastry, pies, sugar, sweets, cakes, cream, milk, spirituous liquors, beers, sweet rums, champagne.

The diet for this condition may be summed up in the following rules:

1st. Drink as little as possible, especially of fermented beverages such as beer.

2nd. Eat no fat-making foods: fats, sugar, starches.

3rd. The other foods may be partaken of in moderation.

THE FOLLOWING ARE SOME OF THE SPECIAL FORMS OF DIET FOR OBESITY:

Ebstein Diet.—*Breakfast.*—Half pint of black tea, no milk or sugar. 50 grammes of white bread toast with butter. *Dinner.*—Soup, 120 grammes of beef, a few fresh vegetables—no starches or sugar. During dinner 2 glasses of white wine, and afterward a cup of tea. *Supper.*—A cup of tea, an egg or 100 grammes of roast meat or ham and 30 grammes of bread and butter.

Oertel Diet.— *Breakfast.*—150 grammes of tea or coffee with 75 grammes of bread. *Dinner.*—100 grammes of soup, 200 grammes of meat, green vegetables in plenty, 25 grammes of bread, 100 to 200 grammes of fruit, preferably fresh, little or no fluids, half pint of light wine at most. *Lunch.*—A cup of tea or coffee with little or no bread. *Supper.*—One to two soft boiled eggs, 150 grammes of meat, 25 grammes of bread, at times a small piece of cheese or some fruit, half a pint of wine.

Sweininger Diet.—At 7 A. M. a chop or a fillet of sole with a small piece of bread, no butter.

At 8 A. M.—A cup of tea with sugar.

At 10.30 A. M.—Half a dinner roll with meat or sausage.

At 12 noon.—*Dinner.*—No soup or potatoes, 2 glasses of white wine, fresh vegetables, meat, eggs, cheese, oranges.

At 4 P. M.—Tea with sugar.

At 7 P. M.—Roll with cheese.

At 9 P. M.—Cold meat, eggs, salad, 2 glasses of wine.

Dujardin-Beaumetz Diet.—*Breakfast.*—25 grammes of bread, 50 grammes meat, 200 grammes mild tea without sugar. *Dinner.*—50 grammes of bread, 100 grammes of meat or 2 eggs, 100 grammes of green vegetables, 15 grammes cheese, fruit ad libitum. *Supper.*—Menu same as for dinner.

This form of diet is characterized by a reduction of the amount of fluid ingested and suppression of all liquid foods.

Bouchard Diet.—Consists entirely of eggs and milk, 1250 grammes of milk and 5 eggs divided in 5 portions to be taken at equal intervals.

Germain-See Diet.—Meat 30 grammes daily, fats 75 grammes, green vegetables plentifully, starches sparingly, abundant hot drinks (tea and coffee) no alcoholics or beer.

Bantny-Harvey Diet.—*Breakfast.*—Lean meat 150 grammes, tea without milk or sugar, toast 30 grammes. *Dinner.*—150 to 180 grammes fish excepting salmon, herring, eels, a non-starchy vegetable, 30 grammes of toast, 2 or 3 glasses of red wine. *Lunch.*—60 grammes of cooked or preserved fruit with a cup of tea without milk or sugar. *Supper.*—90 to 120 grammes of meat or fish, same as for dinner, one or two glasses of white wine.

PHOSPHATURIA.

This condition is caused by denutrition of the organs which contain phosphorus in considerable amount, as for instance, the nervous system. The object of the diet is to furnish the system with phosphates to replace those eliminated.

Give red meats, beef, mutton, which contain more phosphorus than the white meats: brains, sweetbread, foie gras (goose liver) and certain birds: larks, rice birds; fish: roe, caviar, mussels and oysters.

Eggs should be used freely on account of the large amount of phosphorus they contain.

Beans, lentils, turnips, peas, radishes, celery, artichokes, fruit are allowed.

Milk, coffee, and wine diluted with water may be given.

Sugar and alcohol are forbidden.

PREGNANCY.

During pregnancy, a woman usually requires slightly more food, and it requires no argument to prove that the diet as a whole should be nutritious and free from injurious substances. Foodstuffs that a patient has learned from experience tend to produce constipation should be avoided. Fruits, if they agree well are to be recommended. There are no hard and fast rules for feeding a pregnant female, and each case should be handled according to the conditions that arise.

When vomiting is a pronounced feature of the pregnancy, the diet may call for much careful study. According to Thompson, following is a list of dietetic substances which are commonly prescribed for the relief of nausea and vomiting, or for nourishment while those conditions exist: Cracked ice; pancreatinized milk; milk with sodium bicarbonate (ten grains), and cerium oxalate (five grains); milk and limewater; milk and Vichy, soda, seltzer, or carbonic-acid water; Kumyss and Zoolak; beef extracts and raw meat pulp, scraped; strong black coffee; sour lemonade or lemonade and Vichy; clam broth. Dry crackers, dry toast, and ginger snaps will sometimes be retained in seasickness, or a cracker buttered and sprinkled with a little Cayenne pepper; brandy and soda; iced dry champagne; iced brandy diluted with water; soda water, or Apollinaris.

Very severe and protracted cases may require lavage or nutrient enemata.

After Labor.—Following is the regimen used at the New York Lying-in Hospital:

Immediately after labor in a normal case milk diet is given for the first six hours; at the end of that time regular diet.

In abnormal cases the diet is ordered by the physician.

In our regular diet stewed fruits and cereals are given very frequently; no veal or pork is allowed.

In cases of severe engorgement of breasts, fluids are restricted; a dry diet is given, which consists of the regular diet and one glass of milk with each meal; no tea or coffee and no fluid between meals.

In cases of eclampsia milk is always given; also a large quantity of water, either hot or cold, and cream of tartar drink.

All nursing women should be given extra quantities of milk.

DIET IN THE MANAGEMENT OF RENAL DISORDERS.

In the dietetic treatment of renal disorders only the lightest and most digestible food should be given in order to lighten the work of the kidneys and obviate the eventual formation of products which will add to the irritation of the renal structures.

Acute Nephritis.—Milk is indicated for some days, 4 to 7 pints daily, with Vichy or carbonated waters. If the bowels are loose add limewater to the milk, if there is constipation add magnesia or use Carabana. Substitute skimmed milk or buttermilk when milk causes biliousness.

Sometimes oatmeal gruel, groats, rice, barley, flour or arrowroot may take the place of milk. Prepare the above with cream or use lemon to flavor. No vegetables are allowed.

Should the urine show a marked improvement, bread and butter, plain puddings, lettuce or watercress, stewed apples, oranges may be allowed.

Later, eggs, meat broth, and finally white meats are permissible.

Albuminuria.—While it lasts reduce the quantity or abandon entirely all meats. Use no alcohol.

Live principally, if not altogether, on fruits, vegetables and milk.

Chronic Bright's.—An exclusive milk diet when possible, if impracticable, substitute light farinaceous food, bread, rice pudding with plenty of milk. Weak coffee or tea highly diluted with milk is a palatable substitute for milk. Milk soups or purées of celery, potatoes

or gruel may be given persons who dislike milk alone. Milk thickened tapioca, vermicelli, sago or rice are useful for the same purpose.

If milk cannot be taken in any shape, try a diet of fresh vegetables, fruit, butter, cream and olive oil.

Later when patient's condition warrants an abandonment of the milk diet, give milk less and less frequently, gradually replacing it with boiled fish, chicken or game, fresh green vegetables, cream, butter and bacon.

Red meats, cheese and condiments are not permissible, and alcohol should be forbidden.

Pyelitis.—Exclusive milk diet is indicated if there are signs of irritation or painful micturition. Otherwise nourishing and easily digested foods are permissible.

Water, when possible the alkaline mineral waters, should be drunk in abundance to flush the kidneys.

Oxaluria.—Fish, poultry, game and meat, stale bread or toast with butter are allowable.

Tea, coffee, carbonated drinks, alcohol should be withdrawn. Hot water sipped half an hour before meals acts well in these cases. Give a mild saline purgative when necessary. Dilute mineral acids prove beneficial when taken immediately after meals.

Renal and Vesical Calculi.—In these cases one should try to increase the quantity of urine and render it bland.

This can be best accomplished by the use of milk, and water taken freely between meals.

Condiments, mustard, vinegar, pickles, puddings of rice, sago and other farinaceous foods, suet puddings, pastry, meat fat and fat pork are proscribed.

Bread, oatmeal, hominy, cracked wheat, cornmeal bread, custards, blanc-mange, boiled fish, eggs are allowed.

An exclusive vegetable diet for a week or so proves effective in some cases. The withdrawal of meat is not necessary in all cases. It should always be used in moderation, however, never more than once a day. White meat of chicken to be preferred.

Lithemia, Gravel, Uric Acid Diathesis.—The dietetic treatment here consists in abandoning or reducing animal food and drinking plenty of water.

Sugar, fats, highly seasoned foods, condiments, starchy foods (potatoes, rice, sago, etc.), sweet fruits (pears, grapes, plums, strawberries, etc.), alcohol, malt liquors, sweet wines, and champagne are all prohibited.

The patient may eat abundantly of oatmeal, wheat or graham bread (toasted), macaroni, fresh young peas, string beans, lima beans, rice, spinach, asparagus, celery, lettuce and other salad, excepting tomato without oil dressing; fresh fish, sweetbread, poultry, game, eggs may be taken sparingly.

Should the patient need a stimulant, give a little good claret or whiskey in water. Tea and coffee are permissible.

RHEUMATISM.

According to Thompson, while the fever lasts and other symptoms are acute, such as pain and swelling of the joints, the patient should be put upon a fluid diet. The majority of cases do best at this time with an exclusive milk or bread-and-milk diet. Those patients who cannot take milk, however, may be allowed soups and broths flavored with vegetable extracts, chicken tea, milk toast, barley or oatmeal gruel, clam broth.

Large quantities of water are to be ordered, provided the blood pressure is not alarming or there are no other symptoms that would make its use objectionable.

Following is the diet to be suggested after the acute symptoms have subsided.

THE PATIENT MAY TAKE.—*Soup.*—Beef tea, chicken and mutton broth in small quantities.

Fish.—Raw oysters or clams, white fleshed fresh fish—broiled or boiled.

Meat.—Sweetbreads, chicken, tripe, broiled fat bacon or boiled ham (all sparingly).

Farinaceous.—Boston brown bread, corn, whole wheat bread, cornstarch, rice, milk toast, dry toast, graham bread, granum, butter, crackers.

Vegetables.—All except potatoes and cooked tomatoes.

Desserts.—Plain puddings, rhubarb; junket (all without sugar).

Liquids.—Milk, cream, buttermilk, malted milk, alkaline waters, tea, cocoa (no sugar), pure water, plain or with lemon or lime (no sugar).

THE PATIENT SHOULD AVOID.—Red meats, pork, turkey, goose, duck, veal, fried fish, cooked oysters or clams, salted, dried, potted or preserved fish or meats (except ham and bacon). Lobsters, crabs, salmon, eggs, rich pies, made dishes, gravies, potatoes, tomatoes, asparagus, mushrooms, rich puddings, candies, nuts, cheese, coffee, cider, malt liquors, wines.

DISEASES OF THE STOMACH IN GENERAL.

Stomach affections are very numerous and although a special diet is not required for each one, a choice of food adapted to the prevailing symptoms is necessary. Thus the food for hypochlorhydria will differ from that for hyperchlorhydria. Generally speaking all dyspeptics should avoid game, goose, raw and acid fruits, green vegetables, acid and highly seasoned gravies, vinegar, pickles, pepper, mustard, sweets and pastry. While the foregoing are strictly prohibited, other foods are tolerated in moderation: lean ham, sauces, made with oil, butter or suet, butter, new cheese, the soft part of bread lightly toasted.

THE FOLLOWING ARE ALLOWED: Eggs, soft boiled or scrambled, finely minced raw meat, roast meat with the fat and fibre removed, lean fish (sole or flounders, whiting, turbot, pickerel, etc.), sweetbread, calves' brains, young fowl (chicken, capon, pigeons) mashed potatoes, lentils and peas, dry unsweetened cakes, Italian pastes, tapioca and semolina.

As a beverage: Mineral waters, Vichy, Vals, Evian, Pongues, St. Leger or Alice, Vittel, Contrexeville, etc.

These condiments may be allowed: Salt, thyme, bay leaves, onions, but the following should be prohibited: Pepper, green and black, mus-

tard, mace, nutmeg, garlic, scallion, truffles, pickles, capers and other acid condiments. Sauces, white and cream made with milk, eggs and flour may be allowed, but not the acid, highly seasoned sauces such as vinegar sauce, mayonnaise, bearnaise, joinville, shrimp, tomato, brown and green sauce.

Soups are allowed provided they contain only well cooked and strained vegetables or Italian pastes well cooked. They should contain none of the prohibited condiments. The following soups are recommended: Beef, veal, chicken with tapioca, sago, arrowroot, semolina, cornstarch, flour, oatmeal, groats, according to the patient's taste. Milk soup, plain or with Italian pastes, bread or strained vegetable soup.

The patient must not eat fish, soup, bisque, highly seasoned soups, nor those containing cheese or toast, onions, leek or sorrel. All hors-d'oeuvres are prohibited with the exception of lean, slightly smoked ham.

The following vegetables are allowed: Potatoes, Jerusalem artichokes, artichokes, carrots in moderation, asparagus, cauliflower, green peas, beans, spinach, rice, pumpkins and string beans. However, sorrel, celery, cabbage, turnips, tomatoes, eggplant are forbidden.

Fruits allowed are: Peaches, apricots, green gages, blue plums, provided they are ripe, peeled and stewed. Stewed strawberries, raspberries, sweet cherries, mulberries, pears, apples, rhubarb and bananas. The fruit should be stewed with very little or no sugar. In the way of pastry only dry cakes without sugar such as dry gingerbread, Albert biscuits and Arras hearts.

Dilatation of the Stomach.—The diet for this affection is regulated by two rules:

1st. Reduce to a minimum the volume of the food.

2nd. Prevent all abnormal fermentation.

To carry out the first of these, absorption of large quantities of water must be avoided, especially charged waters which give off carbonic acid gas, green vegetables, especially salads, soups and in a word all bulky food should be prohibited. Abnormal fermentation may be avoided by prohibiting dark rare meats, delicatessen food, preserved or salted meats, oily fish, shellfish, fats and strong cheese.

FOODS ALLOWED ARE: White meats, well done red meats, with little gravy, beef a la mode, pot roast, boiled eggs, cereals, well cooked green vegetables in moderation, stale well baked bread or toast in moderation, fruit stewed without sugar.

As a beverage, slightly mineralized and charged alkaline waters (Evian, Vittel, Contrexeville), light tea, or infusion of linden flower, 300 to 350 centilitres at each meal.

Patients with dilated stomach may have their meals in two ways:

1st. Meals at long intervals at 11 A. M. and at 6 P. M. with light tea and dry cakes in the interval, if the patient feels very hungry.

2nd. Meals at short intervals, every three hours, according to the Rosenheim method, the principal meals being at 12 M. and at 6 P. M.

Warm drinks should be taken between meals as it is unwise to diminish the liquids too rapidly and thus decrease the diuresis in arthritic patients.

Hyperchlorhydria.—In this condition two forms of diet may be prescribed:

1st. Milk diet combined with eggs and meat powder.

2nd. Mixed diet as recommended by Mathieu, as follows: Boiled or roasted meats, lean fish, boiled or fried, mashed potatoes, cooked green vegetables, soft boiled or scrambled eggs, apple or pear marmalade, dry cakes, biscuit, toast in moderation.

Drink: Hot infusions and any mineral table waters.

Milk diet is indicated only when the patient's appetite is impaired and he suffers gastric pains.

Milk should never be taken with meat as it retards digestion.

Hypochlorhydria.—As in the preceding condition the doctor has the choice of two diets: Strict milk diet or mixed diet. The indications for milk diet are complete loss of appetite and persistent pains after ingestion of food. In all other cases mixed diet should be prescribed.

ALLOW meats of all kinds, (beef, mutton, veal, lamb, fresh pork), well cooked or, better still, finely chopped and made into a purée. Eggs, soft boiled, poached or broken into soup. Lean fish: sole, flounders, cod, whiting, brett or brill, turbot. State or toasted bread.

Feculent vegetables, preferably in purées, green vegetables in moderation with the exception of cabbage, tomatoes, sorrel and cucumbers. Herb and vegetable soups, well salted. Use salt extensively as it aids the secretion of hydrochloric acid. Condiments should be used sparingly. Olive oil, butter and cream are tolerated.

Stewed fruits, (sweet) cream, fresh cheese, non-acid preserves, raw grapes (providing the skin and seeds are removed).

Drink: Light non-acid white wine, stimulating mineral waters, Pongues, St. Leger and Alice, Condillac, Red Bordeaux, and in some cases Burgundy wine aged in bottle, providing they are carefully decanted. Tea, coffee with very little brandy or warm infusions of linden flower, orange flower or chamomile.

The meals should be widely separated, breakfast at 8 A. M., dinner the principal meal at 12 M. and supper at 7 P. M.

DIET AND SURGICAL OPERATIONS.

Diet Before Operation.—According to Collum if an operation (in a healthy subject) is to be performed at 9 o'clock in the morning, the patient should be left asleep, unless he awakes of his own accord, until at any rate 7.30, when he may be given his enema. Then, if he be accustomed to breakfast about 8 o'clock, he may have a thin slice of bread-and-butter, or a small piece of toast, with as much tea to drink as he desires. He will then be able to settle down much more contentedly to his newspaper until the surgeon arrives. If the operation be at 10 or 11 o'clock, he may have a similar breakfast, but with two thin slices of bread-and-butter, if he wishes, or a somewhat larger piece of toast, provided his usual breakfast hour be 8 o'clock. If, however, he be accustomed to breakfast at 9, the amount of solid food should be as in the first case, unless the excitement of the approaching ordeal has caused him to awake earlier than usual, under which circumstances he may also have his small meal a little earlier. If the operation be arranged for 12 or 1 o'clock, he may be given an ordinary light breakfast at the usual time; meat, however, being avoided. A glass of water might in this case, be taken with advantage about 11 o'clock. For an

operation at 2 or 3 o'clock, the ordinary breakfast should be taken at the usual time, and a cup of hot clear soup or beef tea at 1 o'clock, together with a little water to drink. This same arrangement is suitable for a patient to be operated on at 4 o'clock, except that in this instance a little toast, bread, or biscuit may be given with the soup. If 5 o'clock be the appointed hour, the breakfast and lunch should remain the same, but in addition a cup of tea may be taken at, or a little before, 4 o'clock. If the hour is 6 o'clock, the patient may have his ordinary breakfast, and then a light luncheon consisting of fish or poultry at about 1 o'clock, followed by tea with bread-and-butter at 4 o'clock. Finally, a patient who is to be operated on at 7 o'clock may partake of his usual breakfast, lunch and tea, simply avoiding currant cake or any thing rich at tea-time. No fruit of any kind should ever be taken on the day of the operation.

In operations on the intestines or abdominal organs the diet for the preceding twelve hours must be wholly liquid.

TUBERCULOSIS.

According to many authorities the diet of tuberculous subjects may be described in one word—superalimentation or forced feeding. This consists in giving the patient the greatest possible amount of nitrogenous and fatty foods. The object of superalimentation is to improve the nutrition so that by increasing bodily resistance there is less tendency to the development of the tubercle bacillus.

The choice of meats and the quantity allowed depend upon the condition of the patient's digestive organs. In general, however, all meats are suitable for superalimentation.

If the patient is only slightly affected with the disease and the appetite is good, one may begin at once to give large quantities of fat meats preferably. When on the other hand the patient has a high temperature and the appetite is impaired it is advisable to begin with a small amount of lean meat, as the latter is more easily digested, roasted or broiled, finely chopped raw in meat balls or spread on bread or added to a cup of broth.

Fish, especially the fat kind: eels, herrings, mackerel and shellfish are allowed.

Fowl are also suitable, especially the liver (pâté de foie gras).

Should the patient have a repugnance for raw meat any of the various meat juice preparations may be given.

There are several methods of preparing meat juice: 50 to 250 grams of top round of beef are chopped fine, covered with 100 grams of slightly salted boiled water and left in a cool place for 12 hours. The whole is now passed through a fine sieve or colander covered with cheese cloth and rubbed up in a mortar.

Lean beef (round) chopped and squeezed under pressure gives up juice in the proportion of 230 grams per 1000 but only about 6% is albumin.

A good way to prepare meat juice is to take a tender juicy piece of beef, broil it for several minutes over a quick fire so as to coagulate the outside and retain the juice. Then cut into small pieces and squeeze in a meat press. Salt to taste. This meat juice while quite nutritious is less so than scraped raw meat.

Fats.—These are just as useful as meats, the best is undoubtedly cod liver oil which should be taken preferably at bedtime so that it can be digested during the night. Butter should be used in abundance, both on bread and in sauces or gravies.

Other Foods.—Bread should be given in small quantity so as to leave room for nitrogenous and fatty foods. Whole wheat bread is to be preferred to ordinary white bread. Eggs should be given medium or soft boiled, baked or raw in milk. Rich creamy milk should be taken in quantity between meals: cows', asses' or goats' milk being used for the purpose. Kefir and Koumiss are also beneficial. Vegetables should be used in moderation only to aid in eating meat. Fruit, olives, nuts containing much oil should be partaken of sparingly.

Beverages.—There is no restriction as to what the tuberculous patient undergoing superalimentation may drink. Beer, good wine, alcohol may be used in moderation. In congestive forms of the disease, alcohol should be strictly prohibited. Mineral waters, preferably those containing lime or iron are allowed in all except the congestive form where the ferruginous waters are forbidden.

Meals.—The tuberculous patient should have four meals a day: breakfast, dinner, afternoon lunch, supper. Between meals he should

drink several glasses of milk to which a raw egg or meat powder has been added.

At the Falkenstein Sanatorium the meals are served as follows:

7 A. M.—Bread and butter with honey, milk 250 to 350 grams, sipped slowly.

10 A. M.—Bread, butter, cold meat, fruits.

1 P. M.—Dinner composed of various nutritious dishes.

4 P. M.—Bread, butter, milk.

7 P. M.—Supper, meat, vegetables, fruit.

9 P. M.—Milk with 10 to 20 grams of brandy.

Effects of Superalimentation.—This form of feeding increases the bodily weight often from 500 grams to 2 kilograms during the first month. This weight, however, may decrease and changes take place in the organism which cause symptoms of arthritism: neuralgia, headache, eczema, hemorrhoids, which symptoms are due to excessive production of uric acid. When these latter become too severe the amount of meat allowed must be diminished and in some cases milk diet must be ordered for a short time.

As a result of superalimentation there sometimes occur symptoms of intolerance, due to the accumulation of alimentary toxines in the system: headache, dyspnea, nausea and vertigo. At times there is diarrhea, vomiting and congestion of the liver. When these occur the fats and nitrogenous foods must be diminished or given up altogether and replaced by a milk diet. A milk purgative is indicated if the symptoms still persist.

A Useful Regimen.—The following constitutes a very excellent regimen for tuberculous patients:

As soon as the patient awakes in the morning he or she should take, while yet in bed, a glass of hot milk with a slice of milk toast. After a little while (½ hour) he will rise and prepare for his douche, friction or massage, whatever the physician has prescribed for him. After this, it will probably be 8.30 o'clock when the patient will take his ordinary breakfast. He should have eggs or meat just as he chooses. The eggs should be served poached, soft boiled, raw or in the form of egg-nog, with or without a little sherry, orange or lemon juice, as the patient desires. The meat breakfast should be of broiled steak,

chops, poultry, sweetbread or raw chopped beef. Bread a day old, preferably whole wheat bread, or French rolls, but not hot, with plenty of butter or honey. Either milk, cocoa or coffee without milk, may be a part of the breakfast. Clear coffee of medium strength will not be so apt to disturb digestion as it will with milk added. Some fruit should always precede the egg or meat in the morning. It should be left to the patient's own fancy, as to whether he takes cereals for breakfast or supper. The patient should take the heartiest meal between the hours of twelve and two o'clock.

Broths or soups should be the first course. Below is a diet list, you may give patients to chcose from.

Cereals.—Cream of Wheat, oatmeal, hominy, farina, cracked wheat.

Soups.—Oyster, clam, beef, barley, rice, pea, celery.

Meats.—Beef (rare) roast or broiled, mutton or lamb, turkey, beefsteak, all fish (broiled or boiled), chicken.

Vegetables.—Spinach, celery, string beans, cauliflower, onions, lettuce, asparagus, green peas, potatoes.

Fruit.—Apples (baked or stewed), oranges, grapes, pears, peaches, olives, strawberries.

Miscellaneous.—Eggs, rice, macaroni, spaghetti, blackberries, sago, tapioca, ice cream, cocoa, toast, lemonade, milk (3 pints daily), custard.

ULCER, GASTRIC.

Diet unquestionably is of the utmost importance in the management of gastric ulcer and according to Einhorn should consist of liquids—milk, milk with strained barley, or oatmeal, or rice water; plain water, weak tea and peptone (one teaspoon to a cup of water). Debove and Rémond have suggested the addition of lactose and of meat powder to the milk, in order to make the diet richer in nourishment substances.

As a rule, we employ the above-named additions, which fulfill the same purposes, besides varying the monotonous bill of fare.

First week. During the first week we give the patient half a cup (about 100-150 c. c.) of either, every hour. Everything the patient

takes must be neither cold nor very warm, and should be taken slowly (sipping, or with a spoon).

Second week. During the second week we order the same kind of food, with this difference, that he is nourished every two hours, and gets a cupful or a cupful and a half (200 to 300 c. c.) at a time.

Occasionally we now allow the patient one raw egg beaten up in the milk, once or twice a day. In the beginning of the third week we feed the patient every three hours; he is allowed barley, farina, and rice (well cooked) in milk, soft-cooked eggs, crackers softened in milk, in addition to his previous foods; in the third day of the third week we begin to give the patient meat, first raw, well scraped, then broiled.

Thereafter we go over to the ordinary daily diet, excluding heavy salads, pastry, raw fruit and the like.

Mallory points out that raw meat, especially cured meat, such as scraped ham, as well as bouillon, meat broth, and rich meat soups, are unsuitable ingredients for diet in cases of gastric ulcer, for here a diet is needed which is easily digested, leaves the stomach promptly, and does not tend to increase the hydrochloric acid. It should be remembered that milk, cream, unsalted butter, and olive oil should be used to as great an extent as possible, on account of their higher nutrient value, liquid form, and because the fats tend to reduce the acidity. They leave the stomach promptly and tend to reduce the pyloric spasm which is often present when the ulcer is situated in that region. Therefore, when the feeding by mouth is resumed, the diet should consist of milk, with from three to ten per cent. of cream, thoroughly cooked porridge and oatmeal, rice meal, corn meal, with milk, cream, and sugar added to taste. Raw or very soft boiled eggs, crackers, buttered toast, or milk toast to be added later. Purée of peas, potatoes, and poached eggs, junket flavored with fruit juices, and custards are also suitable. Malted milk and the various concentrated prepared foods can be added to give variety to the diet. Pea soup, sago, tapioca, minced chicken, tender fresh fish, brains, and sweetbreads should be added later. The quantity taken at one meal should never exceed eight ounces. The temperature should not be above 101° or 102° F.; that is, warm, but not hot. The medical treatment is directed to reducing the acidity, relieving pain and pylorospasm, and possibly

toward exerting some direct influence on the ulcer itself. As constipation is usually present, it must be taken into consideration and the treatment modified accordingly.

WHOOPING COUGH.

In whooping cough the paroxysms of coughing are so severe as to give rise to vomiting, and in bad cases they are excited by taking food which does not have an opportunity to become assimilated, and nutrition may suffer very seriously in consequence, adding to the general exhaustion which accompanies the disease. According to Thompson,[1] all food must be made easily assimilable. It is best to give food regularly in moderate quantity at each time, and it should be predigested if necessary. Pancreatinised milk, kumyss, the prepared amylaceous foods, cream toast, eggs, junket, chicken broth, malted farinaceous foods, custard, milk puddings, gruels thickened with meat extracts, and stimulants in the form of egg albumin in sherry, egg-nog or milk punch, are recommended for patients who vomit solid food. The worst cases require nutrient enemata, as exhaustion becomes critical.

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[1]W. G. Thompson, M. D., "Practical Dietetics."

CHAPTER XI.

THERAPEUTIC USES OF FOOD.

THE CLASSES OR VARIETIES OF FOODS BEST ADAPTED TO VARYING CONDITIONS OF THE BODY—SPECIAL VALUE OF CERTAIN FOODS IN CERTAIN CONDITIONS.

From time immemorial the special value of certain foods for combating certain conditions has been recognized. Indeed it has long been broadly appreciated that many different foods have distinct utilities over and beyond the fundamental service they render as pure nutrients or body builders. In this connection reference is not made, therefore, to the tonic or reconstructive action of foods in general and their ability to overcome and remove many functional ailments simply by restoring the nutritional balance. But in speaking of the therapeutic uses of various articles of diet, the idea is to point out the capacity which certain foods or groups of foods have—after use for sufficient periods—of modifying some bodily process or function, and by such modification to accomplish—or at least give material aid in accomplishing—the correction of the aberrant conditions, in other words, to bring about the resumption of the normal or natural status. For instance, there are certain foods, which used regularly tend to promote activity of the glands of the gastro-intestinal tract; still others are known to have the power of increasing the hepatic or liver function. The first mentioned foods in consequence of their tendencies are to be recommended in the broad group of affections which fall within the category of indigestion; the second class seem to have a well defined utility in overcoming hepatic torpor or the so-called bilious dis-

orders. Another group of foods are believed to possess alterative properties and because of these have long enjoyed special favor in the strumous or scrofulous diseases, or those affections characterized by lymphatic derangement or blood dyscrasia. Still others have a well marked capacity of promoting regularity of the bowels.

It will be readily appreciated by the physician who has made any study whatsoever of foods and their action in the human body, that much depends in every instance on the personal equation, i. e., the special reaction which each individual shows to any particular food at any particular time. The chapter on General Considerations emphasizes the all important part played by this personal equation and it is only necessary in passing to state that the therapeutic activity or virtue of any food or class of foods is largely determined or controlled by the response which each body makes thereto, and which response depends on the personal factors present in each case.

But in spite of the modifying and controlling influences that are encountered in each case, certain foods or groups of foods show tendencies to act with sufficient uniformity and constancy to warrant the following classifications, which though mainly suggestive the physician can utilize in accordance with his judgment and experience.

I. *Peptogenic foods*[1]—those which increase the secretion of gastric juice. Serviceable in poor appetite and weak digestion.

1. Concentrated fruit sugars.

Malt preparations, prunes, figs, raisins, dates, dried sweet fruits.

[1] From The Science of Living. By Wm. S. Sadler, M. D. Published by A. C. McClurg & Co., Chicago.

2. Concentrated fresh fruit juices.
   Apple juice, blackberry juice, blueberry juice, grape juice, orange juice, peach juice, pear juice, pineapple juice, plum juice, raspberry juice, strawberry juice.
3. Concentrated vegetable juices.
   Soups and broths of the following vegetables:
   Asparagus, beans, celery, peas, corn, potato, spinach, tomato, carrots.
4. Well dextrinized (baked or toasted) cereals.
   Zwieback or toasted bread, toasted crackers, well-parched corn, toasted flaked cereals, thoroughly baked mushes, browned rice.
5. Meat broths.

II. *Foods which lessen the secretion of gastric juice.* Indicated in all cases of hyperacidity, sour stomach, heart-burn, etc.

1. Fats lessen the secretion of hydrochloric acid.
   a. Animal fats.
      Flesh fat, butter, cream.
   b. Vegetable fats.
      Ripe olives, olive oil, nuts, especially Brazil nuts, filberts, pecans, pine nuts, and peanuts.
2. Protein combines with the acid in the stomach, thereby lessening its harmful effects. The following protein foods are especially valuable:
   Cottage cheese, gluten mush, white of egg, buttermilk, lean meat, milk, peas, beans, lentils.

III. *Laxative Foods.*

1. All forms of sugar, especially fruit sugar, honey, syrups, malt. All the concentrated fruit juices. Sweet fruits, such as figs, raisins, prunes, fruit jellies, etc.
2. All sour fruits and fruit acids.
   Apples, grapes, gooseberries, grape fruit, currants, plums, tomatoes (buttermilk and koumiss).
3. Fruit juices, especially from sour fruits.
   Grape juice, lemonade, fruit soup.
4. All foods rich in fat.
   Butter, cream, eggs, eggnog, ripe olives, olive oil, nuts, especially pecans and Brazil nuts.
5. All foods rich in cellulose.
   Wheat and corn flakes, asparagus, cauliflower, spinach, sweet potatoes, green corn and popcorn, graham flour preparations and oatmeal foods, whole wheat preparations, apples, blackberries, cherries, cranberries, melons, oranges, peaches, pineapples, plums, whortleberries, raw cabbage, celery, greens, lettuce, onions, parsnips, turnips, Lima beans, peanuts.

IV. *Constipating Foods.*

1. Liquid and semi-liquid foods which contain little or no solid residue. Most soups, gruels, etc.
2. Rice, fine flour white bread, corn starch and other purely starchy foods.
3. Iceland moss, gelatin, etc.
4. White of eggs and boiled milk.

5. Rice and tapioca puddings.
6. Gluten mush and most of the purely protein foods, such as the lean meats.

V. *Aseptic Foods.* Useful in catarrh of the stomach and bowels, flatulency, etc.

1. All the peptogenic foods (List I) are indirectly aseptic, in that they increase the secretion of the gastric juice, which is germicidal.
2. All fresh fruit juice, especially the acid fruit juices of grapes, gooseberries, grape fruit, oranges, lemons, plums, sour apples.
3. Dextrinized cereals.
   Zwieback, toast, toasted flake cereals, baked potatoes, browned rice, etc.
4. Non-flesh diet.
   Fresh fruit, berries, etc., fruit soup, nuts.
5. Buttermilk and koumiss.

VI. *Blood-making Foods.* Useful in anemia and emaciation.

1. Yolks of eggs raw or soft-boiled.
2. Spinach and tomatoes because of their iron.
3. Potatoes and green vegetables because of their salts.
4. The nuts because of protein and fat.
5. Malt preparations—non-alcoholic.
6. Legumes—bean and pea soup and purees.

VII. *Fattening Foods.*

1. All foods rich in fat such as:
   Butter, olives, olive oil, fat meats, nuts, corn and oats, cheese, eggs, milk, cream.

2. All foods rich in starch.
   The cereals, breads, pastries, etc.
3. All foods rich in sugar.
   Sugar, syrups, malt, honey, beets, sweet fruits, etc.
4. Foods easy of digestion and assimilation.

VIII. *Diabetic Foods.*

1. Fats in moderate amount, butter, etc.
2. Proteins, especially in the form of nuts and cottage cheese.
3. Most of the acid fruits, apples, etc.
4. Most of the vegetables, except beets.
5. Baked potatoes—small amount. While they contain starch, their salts aid in alkalinizing the blood and thereby increase oxidation of sugar.
6. Gluten bread and biscuits.
7. Eggs.
8. Buttermilk and koumiss.
9. Spinach, greens, and artichokes.

IX. *Antacid Foods* for acid dyspepsia, etc.

1. Fats of all kinds.
   Butter, cream, milk, yolk of eggs, nuts, ripe olives, olive oil.
2. Protein foods.
   Lean meats, white of eggs, nut meats, eggnog, cottage cheese.
3. Cold or frozen foods. (Especially in ulcer of the stomach).
   Frozen malted milk, frozen malted nuts, ice cream, frozen malt honey.

4. Toasts and Zwieback.
5. Toasted flake foods.

X. Liquid Foods for gastric ulcer, etc.
1. Rice and gluten gruels.
2. Potato porridge.
3. Legume soups and broths.
4. Vegetable soups and broths.
5. Koumiss and buttermilk.
6. Eggnog.

XI. *Anti-fat Foods,* for obesity.
1. Limit the amount of daily food.
2. Restrict the diet to two or three articles.
3. Avoid all fatty foods.
4. Avoid liquid foods.
5. Select diet from the following:
Buttermilk, hard breads, eggs, vegetable broths, gluten mush, sour apples and sour fruits, bananas, lemon, celery, tomatoes, greens.

XII. Rheumatism, gout, and neuralgia, including sick headache, Bright's disease, arterio-sclerosis, etc.
1. Avoid rich foods, meats, tea, and coffee.
2. Use foods under aseptic diet (List V) except meat broths.
3. Some cases should avoid milk, cheese, and other foods high in protein.

INTESTINAL PUTREFACTION AND THE LACTIC ACID PRODUCTS.

Recently as a result of the studies and researches of Metchnikoff and many other investigators, sour milk, buttermilk and certain fermented milk preparations have come into vogue as

possessing special value as intestinal antiseptics. These preparations, owing to the fact that their virtue is believed to lie in the lactic acid bacteria and ferments which they contain, are grouped under the generic term, lactic acid products. That they have real therapeutic value in controlling intestinal putrefaction and the other processes which give rise to auto-toxemia and kindred affections, has been clearly proven. Sour milk and buttermilk have long been recommended in intestinal catarrh, chronic constipation, mucous colitis and chronic Bright's disease. Clinical investigations point conclusively to the value of the lactic acid products in all affections resulting from or attended by intestinal toxemia. Buttermilk is very beneficial in renal disorders, but it is in the chronic gastro-intestinal derangements that its utility seems to be greatest. It controls fermentation and reduces the amount of toxic products that otherwise would be disseminated throughout the body. While natural freshly made buttermilk is to be preferred, there are several reliable tablets on the market containing the lactic acid bacilli which on being added to proper quantities of milk produce a serviceable substitute for the natural product.

Certain Uses of Fruits and Vegetables.—Scientists have discovered of late that the juice of the pineapple contains a digestive principle very much like pepsin, the action being the same, and it is recommended as useful in dyspepsia. It has been found that the juice acts upon the casein of milk just as rennet does, and the experiment has been tried of placing a slice of raw beef between two thick slices of fresh ripe pineapple, and the character of the beef has been completely changed within three to four hours. The action of the juice, like pepsin, is digestive.

Pineapple juice is now being made use of by physicians in some cases of diphtheritic sore throat and croup, the false membrane being not infrequently dissolved, by the powerful, insidious acid of the tropic fruit.

Cranberries are now regarded as one of the best remedies for malaria and for erysipelas. The best way to take them medicinally is raw; the chemical properties of the contained acid are then complete, whereas in cooking they are somewhat weakened. There are two delicious ways of eating cranberries raw —in a salad and in a beverage. As a salad the largest, ripest berries are selected, washed and cut in halves and served on crisp lettuce leaves with a dressing of olive oil, lemon juice and egg. As a beverage the cranberries are crushed and left to soak in water overnight. The acid in the water is extremely refreshing and cooling to the blood.

Cooked cranberries are excellent because of their alterative effect on the system and blood and should be eaten in large quantities.

Watermelon has been found of value in cases of yellow fever and has also been recommended for epilepsy. The pulp should never be eaten, however, for its cellular structure is as tough as that of the pineapple and as indigestible.

Lemons have been appreciated medicinally more than other fruits and for fevers, rheumatism, liver troubles, sore throats, low fever, biliousness and colds they have been used for years. They are of great value, and should always be in the household and partaken of freely. They should rarely, however, be used in combination with cane sugar, as the effect of the one upon the other is sometimes bad for the stomach. The medicinal value of the lemon is lessened by combining it with sugar or any cane product such as syrup or molasses.

Onions are one of the most potent of the vegetables. For nervous troubles they are like a tonic and should be eaten in great quantities, either raw or cooked very simply, and eaten without any other vegetable. Baking thoroughly is the best method of cooking onions when they are to be used as a medicine. They should then be eaten with butter and a very little salt. It is better to use no salt at all. Cases of nervous prostration have been cured by a persistent diet of onions, whole wheat bread and butter and raw eggs, varied with a few simple desserts and pineapple eaten with salt.

Onions are also of value for relieving sleeplessness.

Spinach, dandelion and asparagus act directly upon the kidneys and keep the system pure and free from clogging. Asparagus is best eaten in the spring and summer, but spinach is efficacious the year round.

Tomatoes are perhaps the best vegetable for the liver. They act directly upon that organ, for they contain large quantities of so-called vegetable calomel. They should always be eaten raw when used medicinally, as the action of fire destroys the power of the calomel. Never eat the skin of a tomato; it is indigestible.

Carrots are excellent for the blood and for asthma. They should be eaten raw, but should be finely grated or ground in a food chopper. They may then be eaten as a salad with lettuce and dressing. They are also recommended for nervous patients and should be very, very thoroughly masticated.

Lettuce is excellent for insomnia and for cooling the entire system. It should be eaten green, not white. The green juice in the lettuce is the medicinal part. It is not natural for lettuce to be white, although we all find it so delicious that way.

Celery has remarkable medicinal qualities. It is good for nervousness, rheumatism, neuralgia and nervous dyspepsia. The

green leaves of celery are excellent; also the root when boiled. When one is eating the stalks of celery, none of the cellular part should be swallowed, as it is indigestible; it should be chewed until all the juices have been extracted and then the pulp should be removed from the mouth.

Beets are excellent for making fresh, new blood, and should be eaten raw for this purpose. Grate them fine and serve as a salad with lettuce and a dressing of oil and lemon juice.

FRUIT ACIDS IN TYPHOID FEVER.

"When I took my course in the bacteriological laboratory at Ann Arbor, Mich.," says Dr. D. W. Reed in the *Western Med. Review,* "Dr. F. G. Novy taught us to make each test tube culture medium, either neutral or slightly alkaline if we wished to develop millions of the germs. If we were a little careless and inoculated a test tube that was a very little acid, the germs would not grow well. I resolved that if ever I got my 'sheep skin' I would remember that fact when I got my first case of typhoid fever, and I have done it.

I give the nurse orders to give nothing but water for a day or two, then when the alimentary canal has been thoroughly cleaned out I request that fruit juice shall be given. The best of all fruit juices is that of black grapes. The tartaric acid of the grape is a very unfavorable medium in which to develop the typhoid fever germ.

Sour apple sauce which has been run through a colander or sieve or cranberry juice may be given for a change.

Good buttermilk if it contains enough of lactic acid will also be very acceptable to the patient and will not afford a favorable medium for the germs. It has also been my custom to acidulate the water that the patient drinks with a drop of two of HCl.

In this manner I attempt to keep the intestinal canal acid in reaction constantly. The fever runs a very low course, is seldom above 102 F. or 103 F. at most and the time is much shortened, many cases terminating in from 8 to 12 days."

WATER AND ITS INTERNAL USES.[1]

Although strictly speaking water is not a food, it nevertheless bears such a close relation to the digestion, absorption and assimilation of nutritive material that it cannot be omitted from any complete consideration of dietetic substances. Indeed, its functions, course and general relations to metabolic processes are so intimate that it is generally looked upon as belonging to the realm of dietetics.

The Physiology of Water Drinking.— By far the greater part of almost every cell and tissue of the living body is composed of water. It is absolutely essential to the life and function of all living things. It is the circulating medium of the body, from which the digestive secretions are formed, and by which the food is assimilated and distributed to the individual cells. And finally, water is the agent for dissolving and removing waste products from the body through the various eliminating organs. We literally live, think, and have our being, as it were, under water. The tiny cell creatures of our bodies, from the humble bile-workers of the liver to the exalted thinking cells of the brain, all carry on their work submerged. Accordingly, the amount of water we drink each day, determines whether the liquids circulating through our tissues shall be pure, fresh, and life-giving, or stagnant, stale and death-dealing.

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[1] Practically everything appearing herewith on water and its uses is taken from Dr. Sadler's admirable work on "The Science of Living," published by A. C. McClurg & Co., Chicago.

Water constitutes from 10 to 95 per cent of the food eaten, and is absorbed into the blood through the same channels by which the digested food is taken up. Practically no water at all is absorbed from the human stomach. If liquids are drunk at meal time, they will have to pass out of the stomach into the intestine, before they can be absorbed through the intestinal walls. Thus the water passes into the blood-stream, and its elimination from the body takes place through the kidneys, the skin, the lungs, and the bowels.

Water is essential to the entire process of digestion and nutrition, as all the ferments of the body act upon food substances by the process of dividing them either by the addition or abstraction of water.

Thirst is the expression of the nervous system, constituting a call for water, the same as hunger represents a call for food. Pure water, free from all foreign substances, is the best liquid with which to quench natural thirst.

The Internal Bath.— It is just as important to supply abundance of water for the proper bathing and cleansing of the internal parts of the body, as it is to wash and bathe the external skin frequently. The living tissues are just as literally soiled and dirtied by their life action and their poisonous excretions, as is the skin soiled by its excretions of sweat and poisonous solids. Thus the regular drinking of water is absolutely necessary to enable the body to enjoy its internal bath, and this internal cleansing is just as grateful and refreshing to the cells and tissues, as is the external bath to the nerves which exist in the skin.

By both the old and the young, water must be taken regularly and in proper amounts. Even young children and infants but

a few days old should regularly receive small quantities of water. Infants frequently cry for water, and receive food instead, which deranges their digestion and upsets their nutrition. There must be a regular intake of water from the cradle to the grave.

Water can be called a food only when it contains certain salts, such as lime, iodine, iron, etc. If the food eaten contains an insufficient amount of these salts, it is possible that the body may secure some of them from the drinking water.

Daily Required Water.— The total amount of water necessary varies according to the nature of one's work, the amount of sweating from the skin, the moisture of the atmosphere, the amount of water in the foods, etc. We believe the average person requires about eight glasses of liquid a day; that is, about two quarts. (By the word "glass" we refer to the ordinary glass or goblet, two of which equal one pint). The Japanese, in the practice of their jiu jitsu system, drink a gallon of water a day. This is probably in excess of the amount required by the average person of sedentary habits, who does not take vigorous physical exercise.

How to Drink and When to Drink.—The majority of people need to cultivate the habit of regular water-drinking. As a rule, Americans drink too little pure water and too much of nearly every other kind of liquid. Enormous quantities of soft drinks, soda waters, and other artificial beverages, from the weakest soda-pop up to the strongest alcoholic beverages, are consumed, much to the detriment of the consumers; whereas the regular habit of pure water-drinking would have proved of inestimable value to the health of all.

Ordinarily it is best to take water one glass at a time. It is a good plan not to drink much water within half an hour be-

fore eating, and the majority of people will find it best not to take much liquid for two hours after eating. It is best not to drink at meals, and never should over one glass or one cup of liquid be taken at meal time. If soups or other liquid or semi-liquid foods are eaten, it will be found best to drink nothing at meals.

Those who have the least tendency to dyspepsia or slow digestion, had better take no liquids at meal time. Let such take one or two glasses of water half or three-quarters of an hour before meals, so as to enable the stomach and other organs to secrete the juices required for digestion. It is because there is too little water in the blood-stream, owing to insufficient water-drinking before meals, that some people are seized with such uncontrollable thirst during meal time.

There is great danger in taking large quantities of cold water or ice water when one is overheated or greatly exhausted. At such times, cold water should be slowly sipped to permit of its being partially warmed while passing down the throat to the stomach. The best temperature for drinking water is that at which it is found in wells and springs, or a little above, say from 65° to 75° F.

The daily programme for regular water drinking for one who eats three meals a day should run about as follows:

From one-half to one glass of water on rising.

Two or three glasses of water in the forenoon taken about one hour apart—say at 9:30, 10:30 and 11:30. Or a glass or a glass and a half might be taken at 10 and 11 o'clock.

The same allowance of two or three glasses taken in the afternoon—say at 3, 4 and 5 o'clock.

Most people will also want some water after the evening meal, taking a glass between 8 and 9 o'clock, or at bedtime.

There are many things which modify the amount of water that should be taken, as previously explained; but the above programme represents a systematic scheme for cultivating the water-drinking habit, adapted to persons of ordinary sedentary or indoor employment, such as business men, housewives, etc.

What to Drink.—Pure, unadulterated water is the ideal beverage, adapted to quench the natural thirst of the healthy man perfectly. Pure water is colorless, odorless, and tasteless. It should contain no foreign substance, animal matter, or mineral element.

The addition of sugar, flavoring extracts, ginger or other condiments, alcohol, tea, coffee, cocoa, or chocolate, constitutes adulteration of water and detracts from its value as an ideal health beverage. It results in the cultivation of an unnatural taste. Thousands of people detest water, and will not drink it if they can obtain any other liquid. Such persons need to reform their taste and train their thirst to appreciate water, just as the appetite must sometimes be trained to appreciate and enjoy pure and simple food.

Fruit Juices.— In the condemnation of so-called artificial beverages, an exception should be made of the fruit juices. The fresh, unfermented juices of various fruits come very near being pure, distilled water, as they consist of only a little fruit, sugar and acid, together with small amounts of flavoring and coloring substances, dissolved in pure water. None of these substances contained in pure fruit juice needs to be digested. While they are foods, they are predigested by the sunshine in Nature's own laboratory, so that unfermented fruit juice is a genuine food beverage, satisfying the demands of thirst by means of its distilled water, and contributing its sugar and acids as foods to the body without in any way taxing the digestive organs.

Lemonade, not too sweet, and taken in moderate quantities, is certainly a beverage free from objection when used by individuals in ordinary health. And so fruit or fruit juices can partly take the place of water in the daily requirement of liquids.

There is absolutely no foundation for the popular prejudice against fruits and melons as a cause of summer complaints, or when eaten late in the fall, as a source of malarial fever, etc. Unripe or overripe fruits frequently cause bowel disturbances; as also do the millions of germs which lurk upon the outside of fruits, and which find their way into the stomach and bowels when these fruits are eaten raw without washing or paring. Otherwise the juices of fruits and melons are wholesome food beverages and, when consumed in moderation, can only contribute to our health and happiness.

The fruit acids are very valuable for disinfecting drinking water in emergencies. At times when water is suspected and it cannot be boiled, it is valuable to remember that the juice of one small lemon will almost completely sterilize a glass of water in thirty minutes. Water treated in this way is pretty certain to be free from typhoid, dysentery, and other infectious diseases, which are commonly contracted through the channel of drinking water. If lemons or limes, which are very strong in fruit acids, are taken in too large quantities, they are liable to derange digestion. Some people are especially susceptible to the action of these acids upon the stomach.

CHAPTER XII.

FOOD POISONING.

ERRORS IN EATING—FAULTY HABITS—AUTOTOXICOSIS—POISONOUS FOODS—CONTAMINATION AND ADULTERATION.

In its broad meaning food poisoning is a term applied to any unpleasant, abnormal, harmful (injurious) or fatal effect of substances employed as articles of diet when taken into the body. It properly includes all aberrant or abnormal effects of food stuffs in either their immediate or their remote influences. As has been pointed out elsewhere, there are certain individual idiosyncracies which cause certain foods to act in a poisonous manner, among these being some kinds of fish, particularly shell fish, certain vegetables and fruits, some meats like pork and wild game, more rarely milk and its products like cheese, and so on. Some of these are very constant in their toxic effect on certain individuals, while others may only exert their deleterious action occasionally. Much depends on the individual in most of these abnormal food effects. If indigestion is marked or any well defined metabolic derangement present, there is much more prospect of some disagreeable or dangerous reaction taking place. In many cases the toxic or ill effects of foods are only manifested when ingested in certain combinations. Thus it is well known that the shell fish such as lobsters, clams and mussels, and milk are exceedingly apt to produce very serious results. Certain vegetables should not be eaten with milk such as raw tomatoes, cucumbers, etc. Other combinations might be mentioned but the foregoing are sufficient to show the necessity of care in the selection and combination of foods.

In these days of rush and worry, says Tustin[1], instead of being looked upon as one of the pleasures of life, and meal-times as pleasant breaks in the monotony of the day's work, the business of eating is regarded as more or less of an unfortunate necessity, to be gotten over as quickly as possible. As a consequence, very little thought is given to the use of food, the object only being to get something soft and easily swallowed. Therefore, as the greater bulk of our food has come to be soft cooked starchy material, such as bread, potatoes, cereals, etc., the stomach gets loaded down with undigested starch (due to improper mastication) and as a result the food, instead of being properly assimilated, is the cause of many ailments, as well as attacks of acute poisoning.

"If we glance at the vegetable foods of the present day, we find that hardly any of them require mastication. Boiled vegetables are all soft. The starchy foods, such as potatoes (often mashed), bread (mostly new), (and with little crust), porridge, gruel, breakfast foods, milk puddings, of rice, sago, tapioca; pastry, macaroni, blancmange, cakes, biscuits, and other articles too numerous to mention. Of all these, bread crust and biscuits are the only ones that tend to properly excite mastication, but the former are often avoided and the latter often very soft. The rest follow the lines of least resistance, and slide down into the stomach with pernicious ease, and afford little or no exercise for the jaws or salivary glands.

Modern food is also highly concentrated, in fact how very condensed it is, does not seem to be adequately recognized. Milk, eggs, fish and meat are highly nutritious, the same is true of our more important vegetable foods which contain a high per-

[1] P. B. Tustin. "Foods and Their Relation to Public Health," in *Public Health Journal.*

centage of protein and starch; it would, therefore, be difficult to prescribe an innutritious diet unless of green vegetables and fruits.

Man has learned to separate the nutritious and energy-yielding foodstuffs from their natural combinations, and we now get practically pure protein, fat, starch and sugar in the form of butter, cheese, sago and tapioca, beet and cane sugar. This extreme concentration of modern diet seems responsible for the present prevalence of constipation by promoting overeating and having a tendency to weaken the whole digestive system.

The dietetic instinct undergoes marked changes during advancing years, children show a fondness for sugar and starchy foods, but there is a marked decrease in this class of food, as middle life is reached.

Children are given anything which they ask or cry for, many being regularly fed on the same food as adults, which food is quite unsuitable for them.

The question constantly present is "What is the ideal dietary for a healthy man?" It would be impossible for the physiologist to draw up a table of foods and say "That is the correct diet for a healthy man." Consideration has to be taken of the idiosyncracies of individuals—for instance: a lumberjack consumes a great deal of energy and his muscles produce much waste, whereas, a bank manager has little muscular work, but much thought and anxiety; the diet of the lumberjack must therefore be not only larger in quantity to supply energy to his muscles, but different in kind to that demanded by the brain of the banker. The lumberjack requires large quantities of carbohydrates, but with the banker (if not an active man) a small quantity is advisable.

An ideal diet is a diet where the protein, fat, etc., are properly balanced and sufficient to maintain the individual at the lightest weight consistent with perfect health. It should be simple in quality, consisting of plain bread, vegetables, meats, fish, puddings, etc., cooked without highly spiced condiments and sauces. A simple diet excludes alcohol and strong spices.

The starchy foods of the ideal diet should be taken in a form compelling vigorous mastication and a certain amount of uncooked fruit or vegetables (such as apples, celery or lettuce) should be eaten daily raw. Water should be the staple drink. Digestive troubles are rarely met with in the army, navy, workhouse and prisons, where the food is simple and the meals regular.

Man would avoid many of the ills of the day if he were to give his own diet the same consideration that the horse owner gives to the diet of a favorite animal.

Most men would have far better health and get more pleasure out of life, if they ate and drank according to their actual requirements. Excesses in the matter of diet lead to a long train of disagreeable symptoms—indigestion, constipation and often serious diseases."

PTOMAINE POISONING.

Within the last quarter century the dangers of spoiled, decomposed or decayed foods have been realized, and to the illness or often fatal sickness resulting therefrom the term ptomaine poisoning has been given. While in beginning the study of these maladies they were looked upon as a type of septic infection, as information grew it was established that they were really due to the exceedingly virulent chemical poisons developed from organic material as a result of the decomposition effected by

putrefactive organisms. While there is much that still remains obscure concerning the nature and action of these poisons which Selmi has called ptomaines, the investigations of Brouardel, Casali, Husemann, Selmi, Vaughan, Novy and others have unfolded a wealth of data. The grave dangers presented by these poisons have grown in clinical importance and the resulting illnesses are justly considered among the most serious of any afflicting mankind. For some time these ptomaines were believed to be closely analogous to the alkaloids like strychnin, atropin, morphin, etc. More recently Casali has advanced the opinion that the ptomaines belong to the amido compounds and this view seems to be well founded. Among the earlier cases of food poisoning that received careful study were those that were produced from eating spoiled or decomposed sausage. These were found to be infected by a bacterium which Van Ermengem gave the name of *bacillus botulinus*. The resulting toxins were exceedingly virulent and fatalities were numerous. Many of these putrefactive bacteria were found to develop best in the absence of oxygen and consequently all canned goods proved frequent sources of ptomaine poisoning.

Besides sausage all other kinds of meat, fish, crabs, lobsters, oysters, vegetables, fruits, dairy products, and all organic material used as food have been found the cause of ptomaine poisoning.

The evils of measly pork and the dangers of trichinosis, together with those of tapeworm from meat and other parasites from cheese and other food products have also been shown by further studies, so that without the slightest attempt at exaggeration or extravagance of statement it may well be said that food poisoning is one of the gravest menaces to which civilized people are more or less constantly subject.

Years ago physicians and intelligent people who saw the growth of the problem, began to preach the necessity and advantages of pure food. But merchants and storekeepers went on just the same selling spoiled meat, measly pork, over kept poultry, decayed vegetables and fruit, old eggs and contaminated milk. Cold storage and other methods of preserving perishable foods have fostered the cupidity of dealers, until to-day there are few greater evils that constantly threaten the health of the people at large than impure, imperfectly preserved, contaminated and adulterated foods.

The following discussions of food contaminations and adulterations are more or less authoritative, inasmuch as they are based on and represent the findings of government investigators.

The Use of Coloring Matter.[1]—"Some difference of opinion has arisen among hygienists regarding the wholesomeness of the substances frequently employed for coloring foods. European countries have legally recognized the wholesomeness of a considerable number of coal-tar derivatives. In this country a preference is frequently given by the state laws to vegetable colors, although coal-tar derivatives are more commonly employed.

"As far as their application to the preparation of foods is concerned, coal-tar colors have been found to be much more satisfactory from a technical standpoint than the pure vegetable colors. They are readily soluble, are cheap in consideration of the amount employed, and withstand the action of light and time much better than the ordinary vegetable colors available for coloring food.

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[1] U. S. Dept. Agr. Bureau of Chemistry, Circular 15 and Bulletin No. 84. Part I.

"In addition to any influence on digestion and health which the coal-tar colors may have, a certain amount of arsenic is added to them by some methods of preparation. In some colors, however, prepared with a special view to use in foods, arsenic is practically or entirely absent. In this connection it must be borne in mind that the amount of coloring matter necessary to give a food the desired tint is very small, and the danger to health resulting from its use should not be exaggerated. The question of fraud, however, remains, and the use of color enables the manufacturer to give inferior products the appearance of high-priced foods. Yet again the colors may be used merely to produce an appearance more attractive to the eye and in accordance with popular taste, even though the best materials were employed. Thus, coloring matter may be added to foods for any of the following reasons: It is sometimes placed in jelly and similar preparations when made only from the more expensive fruits and sugar, to make the color more permanent and enable the product to retain its appearance for a longer time upon the shelves of the grocer. If a considerable portion of the fruit has been replaced by meats of apple juice and glucose, the coloring matter is added to simulate the appearance of the fruit that is supposed to be present. In the cheapest grade of jellies, which are made entirely from apple and glucose, and flavored artificially to imitate the product of higher priced fruit, coloring matter is employed to represent the appearance of the product imitated.

"In the preparation of tomato catsup the natural coloring matter of the tomato is largely destroyed. This destruction is not so complete if the product is promptly made as when the pulp is stored for a considerable time before it is used, long stor-

age of the pulp bleaching it to some extent. The addition of a little coloring matter, therefore, has been resorted to for the purpose of imitating the color of the product which is made promptly and by the most careful methods. The addition of color, however, is likely to be abused, and this tendency has resulted in placing upon our market tomato catsup of a deep red color, much more vivid than could possibly be obtained without the use of artificial colors.

"In the preparation of cucumber pickles the natural green of the cucumber is somewhat impaired. Some manufacturers have employed copper compounds for the purpose of imparting to the product a greenish tint. This also has been carried to excess, and we sometimes find upon our market pickles of a bright green hue which is not suggestive of any natural food. The same practice obtains in the preparation of canned peas and beans. The great majority of those products imported from Europe are colored with copper, and as a result are of a much brighter color than the same vegetables cooked when gathered freshly from the garden.

"In the manufacture of butter it is found that the color varies with the season of the year, the feed of the cow from which the milk is obtained, and within certain limits with the breed of the cow. This results in a variation in the color of butter which manufacturers have attempted to correct by adding a sufficient amount of coloring matter to make the color uniform. This practice has also been carried to excess, and the butter now on our market is colored more deeply than is natural. This color varies in different markets of the country. Fortunately, during recent years, there has been a tendency to decrease the color of the butter, and it is to be hoped that before many years people

will demand a product which is prepared without any addition of color whatever.

"Coloring matter is sometimes employed for the purpose of simulating the appearance of a more perfect article than that actually used. For instance, in the preparation of canned tomatoes a product having a certain brightness of color may be obtained if the tomatoes are perfect, fully ripe, and of certain varieties. Often, however, the tomatoes delivered to the canner do not yield a product of the desired color. For this reason some canners make a practice of adding coloring matter to their product, thus giving it an appearance which they say is more acceptable to their customers.

"Again, in the case of meat, the color disappears after considerable time, the meat losing its bright, fresh color before the process of decay is evident. Therefore, the coloring matter is not usually applied to fresh meat held at low temperature, but to chopped meat, Hamburg steak, and sausage, the addition of coloring matter to this product thus giving it the fictitious appearance of fresh meat.

Baking Powders and Baking Chemicals.—"Baking powders consist of a mixture of bicarbonate of soda with some acid ingredient. When the powders are moistened, these two substances unite and liberate carbon dioxid gas. To prevent the two substances mentioned above uniting prematurely while the baking powder is still in the package, owing to moisture in the atmosphere, starch is usually employed as a filler. Some brands are claimed by the manufacturers to contain no filler, but to consist exclusively of sodium bicarbonate and the acid ingredient employed.

Canned Vegetables.— "Canned vegetables constitute a class of products relatively free from adulteration by means of foreign substances. Imported canned peas are commonly colored with copper sulphate. Owing to the enforcement of the imported food law by the Bureau of Chemistry, the presence of copper is now almost universally stated on the labels of these goods. Peas and beans grown and canned in America are rarely colored.

"One of the most frequent frauds in this class of products is the preparation of goods which have reached a relatively mature state, and the selling of such products as first grade. Mature peas, for instance, are sometimes soaked for the purpose of softening them, canned and sold as peas of first quality. Again, peas that are not thoroughly ripe, but so nearly mature as to be relatively hard and white, are sometimes canned as a high grade article.

"At the period at which sugar corn is canned the sugar disappears very rapidly after picking and it is customary to add some sugar at the time of canning. During recent years many canning establishments replaced sugar with saccharin, an artificial sweetening material derived from coal tar. A few years ago it was customary to bleach corn for canning by means of sulphites, but this practice has been almost entirely discontinued.

"Tomatoes are sometimes colored artificially in order to add to the price of an inferior article.

Cereal Products.— "During the last few years the number of breakfast foods on the market has been enormously increased, and very many of them are extensively advertised by means of greatly exaggerated statements regarding their nutritive

value. Some of these products are simply ground with no other preparation than the removal of the hulls, etc. Others are partially cooked, and still others are 'predigested' by means of special treatment.

"There appears to be some doubt as to the amount of advantage derived from the treatment to which the partially cooked and predigested foods are subjected. All breakfast foods when thoroughly cooked seem to be equally as digestible as the products placed on the market in a more advanced state of preparation.

"The rumors which have been circulated from time to time that arsenic and other poisonous substances are used in breakfast foods have been entirely without foundation. There is no doubt of the wholesomeness of these foods. At the same time, the exaggerated claims made by the manufacturers regarding their superior nutritive qualities are to be deplored.

Flour.—"There is an impression in some quarters, unfortunately, that flour is adulterated with ground gypsum or other mineral matter. It is also believed by many that alum is used for the purpose of whitening bread. It may be said, however, that these forms of adulteration are not practiced in this country.

"Some years ago an effort was made to place on the market a ground stone for the purpose of adulterating flour. This product was extensively advertised by means of circular letters addressed to millers. As far as we have been able to ascertain, however, the product was never used. At one time during recent years the use of Indian corn flour for the adulteration of wheat flour became somewhat prevalent. This practice was entirely stopped by the enforcement of the federal law relating to

mixed flour. At the present time there is probably no product on our market more free from adulteration than wheat flour.

"Some adulteration is practiced in special kinds of flour. For instance, much of the so-called gluten flour on the market is not at all what it purports to be. Frequently untreated wheat flour is sold for gluten flour. Buckwheat flour and other special articles of that nature are also frequently adulterated with cheaper cereal products.

Cocoa and Chocolate.—"In the preparation of cocoa and chocolate, cocoa beans are roasted, freed from shells, and ground. The resulting product is known as cocoa mass. It contains about 50 per cent of fat (cocoa butter), and is sometimes melted into cakes without any further addition and sold as plain chocolate or bitter chocolate.

"For the preparation of sweetened chocolate, cane sugar is added to the cocoa mass and ground at a temperature sufficient to melt the fat. Milk chocolate is prepared by mixing with the cocoa mass dry milk powder (obtained by the evaporation of whole milk) and sugar.

"Cocoa is obtained by pressing the cocoa mass while still sufficiently warm to melt the fat so that a portion of it is removed. The fat is melted into cakes and sold as cocoa butter, while the pressed cakes of cocoa from which a portion of the fat has been extracted are ground up in the preparation of breakfast cocoa.

"For the purpose of cheapening cocoa and chocolate, starches of various kinds are ground in with the cocoa mass at the time of the introduction of the sugar or with the cocoa after the expression of the fat.

Coffee and Tea.— "Owing to the enforcement of the federal tea law, by inspectors stationed at all ports of entry, it is believed that no adulterated tea comes into this country, and it is probably true that the adulteration of this product is not practiced after entry. Formerly it was believed that many other leaves were used as substitutes or adulterants for tea, and a sample may be readily examined for such adulterants by thoroughly wetting and unrolling the leaves and noting their shape.

"With regard to coffee, however, while it is believed that only the pure product is brought into the country, its adulteration after reaching our shores is not uncommon. The attempts that have been made to imitate the coffee bean have not been commercially successful, but the ground coffees sold in the market are frequently adulterated. For this purpose chicory was usually employed, but has since been largely replaced by articles of lower value—ground peas, wheat, beans, barley, etc., now being commonly used. The principal offense in the coffee trade is misbranding as to country of origin. The sale of Brazilian coffee, for example, as Java or Mocha is unfortunately very common.

"The artificially molded coffee berries, referred to above, are not on the market, as far as is known, but may be readily distinguished by cutting a cross section of the bean and examining its structure. That of the artificial bean is of a compact,, solid, uniform nature, whereas the true coffee has a characteristic structure that cannot be imitated. If pure coffee is desired, therefore, the most practical plan is to buy it unground.

Dairy Products.—*Butter.* "The sale of oleomargarin as butter was formerly very common, but the enforcement of the internal revenue laws, relative to that subject, by the Treasury

Department, and of the state laws, have greatly lessened this species of fraud, although violations of these laws still occur with considerable frequency.

"It is now the custom to treat much of the rancid butter on the market in such a way as to remove the rancidity in the preparation of what is known as 'process' or 'renovated butter.' In the early days of the manufacture of this article it was ordinarily sold as fresh butter. At the present time, however, this product is required to be marked on the wrapper with the words 'Renovated Butter,' and violations of the law requiring this are relatively infrequent. This law is enforced by the Bureau of Animal Industry of the Department of Agriculture in collaboration with the Treasury Department. The chemical analyses necessary in the enforcement of the law are made in the Bureau of Chemistry.

"Butter is sometimes preserved with boric acid, and glucose has sometimes been found as an adulterant. The coloring of butter is usual, and is permitted by the laws of all the states. The principles governing the legislation regarding coloring matter of foods in general have not been ordinarily applied to the coloring of butter. The present tendency, however, seems to be to prepare butter with a lighter tint, and a more natural-looking article can now be found in the market than formerly.

Cheese.— "One of the most frequent methods of adulterating cheese is to prepare it from milk which has been skimmed and to which some other form of fat has been added for the purpose of replacing the fat of cream removed. Both lard and cotton seed oil have been used for this purpose. Cheese which has such an addition of foreign fat is known as 'filled cheese.' Such a product well illustrates a form of adulteration which,

although it may not be at all unwholesome, is fraudulent, and if sold as full cream cheese constitutes a form of misbranding. Such a sale is unfair to the buyer, aside from the question of price. If the cheese is desired for melting, as in making a Welsh rarebit, or for other use in cooking, the foreign fat or oil of the filled cheese will separate much more readily than from a genuine cheese, leaving a gummy mass, instead of melting smoothly as a full cream cheese will do.

Cream.— "Cream is frequently preserved artificially. This is illegal in most of the states, but some which prohit artificial preservatives in milk permit them in cream. How this position is justified does not appear. During recent years preparations known as 'thickeners' have been sold to permit dealers to sophisticate their wares. These thickeners ordinarily consist of gelatin, and sometimes contain boric acid for the purpose of preserving the cream.

"Since in the use of cream the dietetic value of fat is taken into consideration, and especially since it is frequently employed in the preparation of modified milk for the use of infants, the sale of a product in which the fat has been largely replaced by gelatin should be condemned in strong terms.,

Milk.—"The most serious problem connected with food control is the regulation of the milk supply. A considerable portion of the milk consumed is employed as food for infants and invalids. In such cases it frequently forms the entire food consumed by an individual. For that reason, and because of the susceptibility of infants and invalids to interfering substances, it is imperative that the quality of the milk supply be carefully guarded.

"The addition of preservatives to milk is particularly to be condemned, partly because of the influences of the preservative

itself on the health of infants and invalids by whom the milk may be used as a food, and partly because of the less cleanly methods that may be employer in the preservation of milk when preservatives are used, and of the increased danger in the consumption of such milk.

"The most common adulteration practiced with milk is the addition of water or the removal of cream. The management of the dairy and the care of the milk from the time it is received from the cow until it is delivered to the consumer are attended by great difficulties. If the milk is to be kept without chemical preservation, absolute cleanliness and prompt, intelligent care are imperative. This is true at all times and especially in the summer. The milk must be cooled immediately and kept cool until its delivery to the consumer, and then delivery must not be delayed too long. Even after the milk is left at the door of the consumer considerable annoyance is caused by many who do not take their milk promptly and place it in the refrigerator. It is frequently allowed to stand at the door for a considerable time, and then many cases of spoiling for which the consumer is responsible are attributed by him to the dairymen.

"In order to avoid these inconveniences the use of preservatives with milk is frequently practiced wherever the enforcement of the food laws is not rigid. In this connection especially the use of commercial preservatives represented to be in conformity with the food laws is of interest.

Fruit Products.—"The class of foods known as fruit products includes jams, jellies, marmalades, and dried and preserved fruits of every description. Glucose is often used as a substitute for cane sugar and coloring matter is employed in order that the color of the finished article may stand for a con-

siderable time on the shelves in the light without deterioration. Coloring matter is also used with cheap fruits in the preparation of a product supposedly made from more expensive products. For instance, jellies are sometimes made of glucose and apple juice, the latter having been prepared from peelings and cores, the by-product of the manufacture of dried apples. These jellies may be flavored and colored to represent the jelly of high-priced fruits, or they may be sold without additional flavor and as a low-priced product. Always, however, when the product of a high-priced fruit is imitated artificial coloring matter is employed.

"Apple juice, as mentioned above, and especially the product obtained from peelings and cores, is used extensively with the cheaper grades of jellies where but little fruit is used. With the cheapest grade of goods, starch is often used as a filler and gelatinizing agent.

"Preservatives, such as salicylic acid and benzoic acid, are often employed with jellies and jams. Their purpose is twofold: First, to preserve apple juice in barrels until it is desired in the manufacture of the finished product; second, to prevent molding in the finished article which is subjected to much less favorable conditions during transportation on trains and in heated storerooms than is the case of the domestic product, which stands quietly, often in a cool, dark cellar, from the time it is made until it is used.

"The exhausted residue from the manufacture of jelly is sometimes used for the preparation of jams, giving to the latter the seeds and other insoluble material of the fruit supposed to be present, while the soluble material is frequently made up of glucose. Occasionally, foreign seeds are used for this purpose.

Glucose, as has been already stated, is commonly used in the cheaper varieties of fruit products, and sometimes, though very rarely, saccharin is employed for sweetening.

Meat Preparations.— "In this class of foods are considered fresh and prepared meat, fish, crabs, oysters, and similar products. The fresh meats on the market are rarely subject to adulteration. Packers depend entirely on cold storage for their preservation, and they are kept at a low temperature, not only in the packing house, but also in refrigerator cars in transit and in cold-storage rooms at their destination until immediately before they go into consumption.

"In fresh meats, however, preservatives are sometimes employed by retail dealers who have not efficient refrigerator service or who desire to keep fresh meat for a considerable time on the block. For this purpose powdered preparations of preservatives are employed, and dusted over the meat from time to time.

"All varieties of meat that are sold in a finely comminuted state, such as chopped meat, Hamburg steak, and sausage, are likely to have a preservative added in their preparation. By this statement it is not meant that preservatives are added in all cases. Their use, however, simplifies the keeping of such preparations and is not unusual. The preservatives most commonly employed with meat are borax or boric acid and sulphites. Oysters, when kept in bulk after shucking, are also frequently preserved.

"It is frequently pointed out by manufacturers that the addition of preservatives does not restore the fresh character of spoiled meat and that they cannot be used for this purpose. As has been stated above, however, sometimes meat, especially in a finely comminuted condition, frequently loses its natural fresh

color before there is any other evidence of deterioration. This color is restored to a certain extent by the addition of sulphites, and the color is very materially preserved if sulphites are added at the time of the preparation of chopped meat. Moreover, manufacturers of chemical preservatives frequently add a small amount of coal-tar color to preservatives consisting of sulphites intended to be added to meat.

"One of the most objectionable forms of adulteration practiced in connection with meat is the sale of the flesh of immature calves. This practice is forbidden in practically all of the states, but the enforcement of such laws has sometimes been found very difficult. Particular difficulty has been experienced in this matter in New York."

CHAPTER XIII.

SOME SUPPLEMENTARY DATA ON ARTIFICIAL FEEDING OF INFANTS—PRACTICAL FORMULAE FOR HOME MODIFICATION OF MILK—NASAL FEEDING.

No attempt has been made in preparing "DIET FOR THE SICK" to take up the broad subject of infant feeding with any degree of completeness or great attention to detail. The various accepted works on Diseases of Children devote so much space to the subject, and the authors, having studied the question thoroughly, are so much better qualified than ourselves to discuss and outline the essential features with accuracy and comprehensiveness, that our only aim, both in Chapter VI and these current remarks, has been to present certain facts of practical importance for the practitioner to utilize as his judgment dictates. The common error in the artificial feeding of infants has been the effort to put the whole proposition on a mathematical basis, i. e., to establish definite formulae made up of arbitrary proportions of cream, milk, water, which formulae have been assumed to be essentially and absolutely correct for the ages indicated. The artificial or substitute feeding of babies has often failed, therefore, and this is not surprising in view of the common neglect to study each little patient together with its digestive, assimilative and general metabolic functions. Individualization is as essential in infant feeding as in the application of all other dietetic principles.

Therefore the following material, as well as that which appears in Chapter VI should be considered in the light of the knowledge which the practitioner should always obtain relative to the digestive and assimilative powers of each infant.

FORMULAE FOR HOME MODIFICATION OF MILK.

It is surely unnecessary to refer again to the desirability, yes, absolute necessity of using milk free from all contamination—and of established purity. Hardly any substance used as food is so potent for harm as milk that is impure and contaminated. Chapter VI gives in considerable detail the satisfactory methods used at the New York Lying-In-Hospital for preparing milk for infants up to the fourteenth day.

The formula suggested for the seventh to the fourteenth day can be used with advantage all through the first month, the quantity for each of the ten feedings each day being slightly increased as required by the child's needs. At the end of the first month it becomes necessary to increase certain of the food elements to provide additional nutritional properties and the following according to Dr. Fischer will be found very satisfactory.

Child 1 Month. Formula 1.

Formula for Home Use.

Take of

Fat	2.0	Cream 4	ounces.
Sugar	5.0	Lime-water 1	ounce.
Proteids	0.75	Water 15	ounces.
Lime-water	5.0	Milk-sugar 6¾	drachms.

The above quantity is to be divided into ten feedings, and heated for 20 minutes to 167° F., and the infant to be fed once every two hours. In Formula 1 we have added more cream and purposely left out the milk. If the infant thrives on this mixture, then we can substitute 1 ounce of milk instead of 1 ounce of water.

After the end of the second month the quantity of food can be increased if the infant's appetite, sleep, stools, and general

condition warrant it. Thus, instead of feeding a bottle of Formula 1, we simply add 1 ounce of milk for the third month to Formula 1.

At 4 Months. Formula 2.

Formula for Home Use.

Take of			
Fat 3.5	Cream 7	ounces.
Sugar 6.5	Milk 1	ounce.
Proteids 1.5	Lime-water 1	ounce.
Lime-water 5.0	Water 11	ounces.
	Milk-sugar 6¼	drachms.

Divide into eight bottles; heat as above to 167° F.; feed every three hours.

For each month from the fifth on to the ninth, one ounce of milk can take the place of an ounce of water, the total amount remaining the same.

From 9 to 12 Months. Formula 3.

Formula for Home Use.

Take of			
Fat 4.0	Cream 8	ounces.
Sugar 7.0	Milk 7½	ounces.
Proteids 3.0	Lime-water 1	ounce.
Lime-water 5.0	Water 3½	ounces.
	Milk-sugar 6¾	drachms.

The above to be divided into five feedings, heated to 167° F., and one bottle fed every four hours.

It is needless to say that a baby's stools should be examined from time to time, and if their condition or the baby's nutrition, points to any error in the diet, the amount of cream or milk should be varied as required. The artificial feeding of every

infant is a tentative process at best, and the practitioner will achieve success in proportion to his ability to interpret the stools of his little patients and place a proper estimate on each child's nutritional condition. Summed up, the successful feeding of infants means supplying each child with the diet that best meets its nutritional needs and digestive capacity.

Nasal Feeding.[1]—For various reasons, but most usually because of diphtheria and the location of the membrane so that it obstructs the pharynx and makes ordinary feeding impossible, recourse often has to be had to nasal feeding.

Modus Operandi.—Lay the child flat on its back and have a large sheet pinned over the body, so that the hands are firmly held; have the feeding-mixture all prepared, so that no time will be lost. A soft-rubber catheter, lubricated with vaselin or glycerin, is gently pushed into the nostril and glided through the pharynx into the esophagus and stomach. When the tube is in the stomach, pour the required amount of food into the funnel so that it flows in the stomach. When the proper amount has been used, gently withdraw the catheter from the nose. It is needless to state that it should be boiled immediately after each feeding.

Quantity of Food.—The quantity of food used in nasal feeding should be somewhat less than is ordinarily used in health. It is understood that only liquid foods—like peptonized milk, sterilized milk, soups, broths, or bouillon—can be used for feeding in this manner. A thin emulsion of egg can also be used. Owing to the frequency of both nausea and vomiting, which may be induced by irritation of the fauces, while the tube is gliding through the pharynx into the esophagus, a much larger interval must be

[1] Infant Feeding in Health and Disease, by Louis Fischer, M. D., New York.

given between the feedings. It is desirable to introduce the tube rapidly and remove it rapidly if it is at all possible. Accidents will result in nasal feeding if a large quantity of liquid food is regurgitated through the esophagus into the mouth and aspirated through the larynx into the trachea. Many a case of *"Schluck-pneumonie"* can be traced to accidents of this kind.

CHAPTER XIV.

REFERENCE BOOKS.

The following books have been freely drawn upon in the compilation and preparation of "Diet for the Sick." Those who propose to become expert dietitians should have all of these works in their library and make a practice of referring to them whenever any doubtful or obscure point arises:

PRACTICAL DIETETICS.—By W. Gilman Thompson, M. D. Published by D. Appleton & Co.

PRACTICAL DIETETICS.—By Alida Frances Pattee. Published by A. F. Pattee, Mount Vernon, N. Y.

HUMAN PHYSIOLOGY.—By A. P. Brubaker, M. D. Published by P. Blakiston's Sons Co., Philadelphia, Pa.

THE SCIENCE OF LIVING.—By W. S. Sadler, M. D. Published by A. C. McClurg & Co.

SCIENTIFIC NUTRITION SIMPLIFIED.—By Goodwin Brown, A. M. Published by F. A. Stokes Co., New York.

NUTRITION OF MAN.—By R. H. Chittenden, M. D. Published by F. A. Stokes Co., New York.

FOODS AND THEIR ADULTERATION.—By H. W. Wiley, M. D. Published by P. Blakiston's Sons & Co.

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